THE

AMERICAN JOURNAL

OF

PHARMACY.

JULY, 1837.

ORIGINAL COMMUNICATIONS.

ART. XVII.—ADDRESS DELIVERED TO THE GRADUATES OF THE PHILADELPHIA COLLEGE OF PHARMACY,

May 8th, 1837, by Daniel B. Smith, Esq., President of the College.

It is now nearly eight years since I had the pleasure of addressing a class of young men, who, like yourselves, had just completed their studies, and were preparing, as you are now doing, to enter upon the career of busy life. More than one of that class have already gained an honourable distinction as scientific and accurate chemists, and for private worth as well as professional eminence; and the College of Pharmacy may, with a just pride, point to them and to many of their successors, and claim them as her children. Since that period, other duties and avocations have very much withdrawn my attention from the pursuits of our profession, and now that I am called upon, by our Trustees, to address you on this occasion, and to extend to you the hand of fellowship, I feel almost a stranger within our own Hall. I am conscious of not having kept pace with that steady march of improvement which has elevated our profession to the important station it occupies; and which is mainly due to the ability with which its members, in France and Germany, have cultivated the science of Chemistry.

I know not that I can select a more appropriate topic of discussion for the present evening than to call your attention

to the changes which the practice of Pharmacy has undergone, in consequence of that cultivation, and to point out to you, what appear to me to be the changes through which it must still pass.

During a long period of ignorance, our science was the favourite pursuit of the credulous and superstitious; and its history—of no value for any other purpose—will ever constitute the most remarkable record extant of the absurdity and folly of learned ignorance.

It was only at the beginning of the last century, that Pharmacy began to be cultivated on enlightened principles. The researches of NEUMANN and LEWIS, although limited to the trial of the solubility in alcohol and water, of the Materia Medica, furnished the apothecary with a guide, by no means despicable, in the practice of his profession, and continued to be the chief authority in the laboratory, until superseded by the elaborate investigations of our own times.

From the time of these researches, we may perceive the prevalence of more correct views of the nature and objects of Pharmacy. The Dispensatories from this date began to be weeded of useless incumbrances. The old formulæ were displaced to make room for others contrived on just principles, and not with the vain expectation of multiplying the efficacy along with the ingredients of a compound.

In the next stage of pharmaceutic improvement, we find the attention of apothecaries directed to the proximate elements, gum, resin, and extractive; and to the distinctive properties of the various species and modifications and combinations of these principles.

With the progress of general Chemistry, additions were, from time to time, made to the list of proximate principles, and the eager and untiring spirit of research, which explored every kingdom of nature, and which, not satisfied with the innumerable variety of substances scattered around us, sought to invent new, and more useful combinations, did not fail to bring rich contributions to that science, which has been justly called the cradle of Chemistry.

For a long time, organic Chemistry presented the appearance of a mighty maze, to thread the intricacies of which, no clue was to be found. The grandeur and simplicity which characterized the inorganic department of the science, were no longer to be traced when the students entered upon the confines of the living world, and chemists abandoned to a mere empirical language and arrangement the whole of this department of their science.

This apparent confusion is now, however, rapidly giving way to an order, as remarkable for beautiful simplicity in the midst of complication, as general Chemistry has long been for its severe and chaste proportions.

In this stage of improvement in the science of organic Chemistry, it is, as I conceive, of the utmost importance for the members of our profession, to devote their labours to its further advancement, and to appropriate to our peculiar department, the rich fruits of the labours of the continental Chemists.

I know not, young men, that I can present before you, a better guide in the pursuit and improvement of your profession than the example of these celebrated men, your fellow apothecaries in France and Germany.

Allow me to repeat to you the language of a veteran Pharmacien, the celebrated Bouillon la Grange, delivered on a recent occasion before the Society of Pharmacy in Paris:—

"It is then in the laboratories, in those depots where the three kingdoms heap up and confound all that they can offer to suffering humanity, where life and death so nearly touch each other, that Chemistry had her birth.

"The Glaubers, the Kunkels, the Charas, the Lemeries, the Rouelles, the Macquers, the Cadets, the Baumés, the Demachys, prepared the materials of the edifice that was erected for it, and which Lavoisier, Priestley, Berthollet, Guyton, Fourcroy, and Chaptal, overturned to elevate another, which was often decorated with the works of Bayen,

Pelletier, Vauquelin, Parmentier, Deyeux, and Proust.

"I have assisted," continues he, "at this magical and sublime rebuilding. I have had the happiness of seeing these men of genius, and been honoured with their confidence; and agreeably with their prediction, I have seen their favourite science, Chemistry, that child of Pharmacy, enriched with a multitude of new facts, and capital discoveries, advance with a sure step towards the explanation of the grandest phenomena of nature.

"But in the midst of this prosperity, with what joy have I always found its most numerous and ardent followers among the Pharmaciens. You know that Chemistry has never had cause to blush for her cradle. More than once has the first academy in the kingdom, sought, in the ranks of the apothecaries, the men who should make her forget the losses she had sustained."

Let me, then, convey to you a sketch, brief and imperfect as it must necessarily be, of those particulars to which I have called your attention.

The discovery of cyanogen was the first great step in organic researches; for it made known to chemists a pseudo-elementary compound, analogous, in all its chemical relations, to the electro-negative elements; thus destroying the presumption that their peculiar properties always indicated a simple substance. This discovery reduced to a beautiful simplicity the theory of prussic acid and its compounds, and taught chemists the true principles on which to investigate the composition of organic bodies. Another most important step in these investigations, was the theory of saponification. All the vegetable and animal oils are composed of two elements, one of which is an organic acid, and the other an oxide of hydro-carbon. When submitted to the action of metallic oxides and water, the base combines with an atom of water and forms glycerine, while the acid unites with the oxide and forms a true salt, which is either a soap or a plaster.

The theory of the ethers is another of the great discoveries

to which I have alluded. Adopting the views of BERZELIUS, we may regard the base of the ethers as a hydro-carbon, called *ethule* containing H^5C^4. It is an electro-positive base, analogous to the metals in many of its relations, combining with the electro-negative elements, and yielding an oxide which combines with acids, forming a class of compounds altogether remarkable and peculiar.

The following table will illustrate this theory:—

Ether	ethule + O, or $\dot{E}l$.
Alcohol	$\dot{E}l + \dot{H}$.
Hydro-chloric ether	$El + Cl$.
Hydro-iodic	$El + I$.
Hydro-bromic	$El + Br$.
Nitrous ether	$\dot{E}l + \ddot{N}$.
Acetic ether	$\dot{E}l + \overline{A}$. &c. &c.

We thus see that ether and alcohol differ only by the presence of an atom of water in the latter, and we comprehend at a glance, the chemical relations of the acid ethers, which, without being salts, are analogous compounds with oxide of ethule for their base.

The discovery of the organic alkalies has had a greater influence on the interests of our business, than any other of these researches. The salts of morphia and quinia have already taken the place, in the shops, of the bulky preparations formerly in use, and the latter, especially, has given rise to extensive laboratories, principally devoted to its preparation. Into the composition of all these vegetable alkalies, as into that of ammonia, there enters an atom of nitrogen. We do not know enough of these compounds to refer them to any general law; but it is highly probable, that they also will be found to be compounds of a highly complex radical.

This is the case with the three alkalies of the Peruvian barks—quinia, cinchonia, and aricina. Supposing the existence of a compound radical, consisting of $NH^{20}C^{20}$,

cinchonia is a protoxide, quinia a deutoxide, and aricina a tritoxide of this base.

An equally beautiful instance of this simplicity of arrangement is furnished in the composition of camphor. The essential oil of lemons is a hydro-carbon, containing $H^4 C^5$. It is isomeric with the essential oil of turpentine, which consists of $H^8 C^{10}$. This hydro-carbon is an electro-positive radical, and has received the name of camphene; for its protoxide is the well known substance camphor, its 5-oxide is camphoric acid, and its chloride is the artificial camphor, produced by the action of chlorohydric acid upon oil of turpentine.

Another compound radical of great interest, which has not yet been insulated, is benzule. It consists of $C^{14}H^5 O^2$. Its hyduret is the essential oil of bitter almonds, its oxide is anhydrous benzoic acid, and it forms a chloride, a cyanide, and a sulphuret.

The essential oil of the spirea ulmaria, which is probably the same oil that is obtained from the gaultheria procumbens, is a hydracid, having a very complex radical. This radical is called spirule and consists of $C^{12}H^5O^8$. It forms compounds with chlorine, iodine, bromine, oxygen, and the metals, in a manner perfectly analogous to cyanogen. The oil of cinnamon is also a feeble hydracid, the base of which forms another acid with oxygen.

The ammoniacal salts of many of the organic acids, when decomposed by heat, appear to be resolved into a new compound, which is such that the addition of an atom of water re-converts it into a salt of ammonia.

The oxalate and the benzoate of ammonia, furnish examples of this change, and the substances into which they are changed are called oxamide and benzamide. Urea is an example of this class of substances. Its composition is such, that the addition of an atom of water will convert it into carbonate of ammonia; while, on the other hand, the abstraction of an atom of water converts it into anhydrous cyanate of ammonia.

The conversion, by fermentation, of sugar into alcohol, and of alcohol into acetic acid, are beautiful examples of this interchange of elements; while the isomerism of alcohol and pyroxylic spirit, of sugar, starch, and gum, of citric and malic acids, renders it probable that they will some day be found easily convertible into each other.

The point to which all these discoveries tend, is the arrangement of organic substances under a few general, yet simple and comprehensive laws; which shall reduce its apparent confusion into order, and teach us that the change of one substance into another, takes place by the abstraction or addition of a few simple elements, very often of water and carbonic acid. In the same manner as a pure oxalic acid is prepared from sugar, and true sugar of grapes, made from lignin and fecula, we may not unreasonably expect, that many of the most valuable articles of the Materia Medica will hereafter be elaborated by chemists from materials at our doors, low in value and easy of access. Why, for example, should not camphor be prepared from its base, camphene, or in other words from spirits of turpentine.

It is this wide, and in a great measure untrodden field of research, that we invite you to explore; and the rewards which are held forth to those who enter it with zeal and industry are as solid as they are brilliant. The period is not far distant when it will be thought discreditable to announce a new remedy from the organic kingdom without insulating the principle on which its efficacy depends. We may look with confidence to the future arrangement of organic products into a few great classes of definite, and probably in most cases of binary compounds, formed by the union with the simple bodies, of a series of highly complex radicals, similar to those of which I have spoken.

When this revolution in organic chemistry is effected, our shops, instead of being filled with tinctures in which the peculiar character and virtues of a medicine are overpowered by the stronger stimulant of alcohol, will contain acids and bases and salts, unalterable by age, and capable of the same

extemporaneous use and preparation as the salts and bases in common use. It is to this approaching and inevitable change in the character of Pharmacy that I wish to call your attention and invite your aid.

In order to appreciate fully the rich resources which chemistry is about to pour into the lap of her parent science, we must take into view the striking connection which exists between the natural characters of plants and their chemical constitution. Whole families are almost as distinctly marked by their common physical properties as by their external characters. The alkalies which give to the cinchonas their peculiar virtue, in all probability exist in many of the affiliated families, masked, perhaps, by their combination with now unknown acids, yet not placed beyond the reach of chemical research.

There is also a large class of medicines which we now obtain in the form of an exudation from certain portions of the plant, yet of which the whole vegetable is filled. The milky sap of the poppy circulates through every leaf and stem, and we gather only the small proportion which exudes from a few small punctures. Is it hazarding anything to assert that ere long the plant will be made to yield the whole of its narcotic principle, and that better processes than are now in use will present it to us in the form of morphia, instead of those isomeric and metamorphosed compounds which are now so embarassing to the experimenter.

The rewards of such researches, I have said, are as solid as they are brilliant. They will increase the fortune of their successful prosecutor, while they will establish his fame. They will bring with them, moreover, a richer and more heartfelt reward in the pleasures of a life, with its leisure hours devoted to the calm and pure pursuits of science, ennobling the character by raising it above that all-absorbing devotion to money, which is the curse and the shame of our country, and by teaching that there are other goods—the cultivation of virtue and morality, and the delights of learning—far to be prized above the evanescent glare of wealth.

Upon you and your fellow graduates—young men---must

rest the future reputation and prosperity of this Institution. When some of us who are now present, were engaged in founding the College of Pharmacy, we were told by many who refused to join us, that we were raising up a set of young men to take the business out of our hands. I told them that I did not fear the result; that we *would* educate a race of young men better instructed than ourselves, and that if we should be forced by their competition to reform our own shops and to review our old studies, both we and the community would be the gainers. I am sure that I was right in my opinion, and that a confidence in sound first principles did not on this occasion lead into any error.

Our College has succeeded beyond our most sanguine hopes. Its *elèves* are at this moment among the most enterprising and the best instructed members of their profession, and, unless they and unless you fail in your duty to yourselves and to the community, the reputation of our College and of its members will go on increasing. It is as true in the present case as it is in the broad and general application to society at large, that the existing generation is but the tenant for life of a patrimony which it is bound by the most sacred obligations, to use and to cultivate, and which it has neither a legal nor a moral right to neglect or to destroy. The Institutions of a community—its foundations of charity and the arts—of literature and religion, form the rightful inheritance of each succeeding generation, and woe to that nation which tramples upon or perverts them.

Take away from our own happy Philadelphia her literary associations, her institutions of charity and benevolence, which infuse into her citizens that calmness and steadiness of character that are so strongly marked as to assimilate to their own nature the multitudes of all nations, that an unrivalled prosperity attracts to her door; take away these and their influence, and we should no longer be able to recognise the features to which our affections cling with an attachment as strong as that of the Switzer to his Alpine vallies. Let me beseech you, young men, never to forget that the theatre of action

upon which your lot is cast, requires of you elevated and manly principles; that you can not sustain the station which rightfully belongs to a liberal and learned profession, as ours is becoming, without devoting yourselves to the pursuits of learning no less than to those of business; and that next to the approving smiles of a good conscience, the search after truth and the delights of science and literature are the best solace of a mind chafed with the anxieties of business and oppressed by the unavoidable calamities of life.

ART. XVIII.—ON LOBELIA INFLATA. By WILLIAM PROCTER, JR.

(An Inaugural Essay.)

AMONG the many medicinal agents of the vegetable kingdom, indigenous to this country, perhaps few have higher claims to the consideration of the physician, than the Lobelia inflata.

Possessed of powerful medical qualities, and capable of making the most decided impressions upon the human system, we have every reason to believe that in time, under the cognizance of the skilful practitioner, it will be numbered among our most valuable remedies.

It was long in the hands of empirics before its introduction into regular practice. The first notice we have of it, as a remedial agent, is in the Massachusetts Reports, for the year 1807 or 8, where an account of its action is detailed in the trial of SAMUEL THOMSON, an empiric, for the alleged murder of an inhabitant of Beverly, by the too free use of this plant.

It has been said that it belonged to the materia medica of the Aborigines of this country, but as far as we have been able to learn, the uses to which they applied it have not been ascertained.

Its medical history is intimately connected with the rise

and progress of a sect in our community, who style themselves Thomsonians, from being the followers of SAMUEL THOMSON, the empiric above alluded to. It stands pre-eminent amongst their remedial agents, and is believed by them to be almost a specific in a variety of diseases. Whether it is really deserving of the high character which they have given to it remains to be determined.

The very fact of its having been thus brought into notice, its powerful and perturbating qualities, and also the numerous and apparently well authenticated eulogiums which have been pronounced upon it as a remedial agent, seem to warrant a more careful investigation of its properties, than has hitherto been made, by physicians or scientific experimenters.

BOTANICAL HISTORY.

The genus Lobelia is distinguished by a five-cleft calyx, five parted corolla, irregular, cleft on the upper side nearly to the base, anthers cohering, stigma two lobed, and capsules two or three celled.

It belongs to the class Pentandria, order Monogynia of LINNÆUS, and to the natural order Campanulaceæ of JUSSIEU, Lobeliaceæ of LINDLEY.

Vulgar names.—Emetic weed, emetic herb, eyebright, wild tobacco, Indian tobacco, etc.

Lobelia inflata. The Indian tobacco is a biennial indigenous plant, varying from six inches to two or three feet in height, according to the vigour of the plant; having a fibrous yellow root, and a solitary, erect, angular, very hairy stem, which in the full grown plant is much branched about midway, but rising from six to ten inches above the highest branches.

The leaves are scattered, sessile, oval, serrate, acute and hairy: flowers disposed in terminal racimes, each flower being pedunculated in the axil of a small leaf. The segments of the calyx are linear and pointed. The corolla is of a delicate blue colour, with a labiate border, the anthers united, curved, and blue, enclosing the stigma. The fruit is an oval, striated,

inflated capsule, crowned with the persistent calyx, and containing in its two cells numerous small brown seeds.

This plant is very common throughout the United States, growing principally by road sides, in neglected fields, and along the edges of woods in clayey sterile soils. It may be noticed along all the roads leading from this city. This species of Lobelia begins to bloom in the last days of 7th month, (July) and its flowers continue to expand in succession until the end of 10 mo. (October.) Dr. WILLIAM P. C. BARTON mentions his having seen it bloom on the 16th of 11th mo., and I can corroborate this statement from having observed an individual plant in flower on the 6th day of the same month on the road between Baltimore and Belair.

When wounded it emits a milky juice. The whole plant is possessed of active properties, but the leaves and capsules are to be preferred, owing to the large amount of ligneous fibre contained in the stalks.

The time for gathering the Lobelia inflata is when the capsules upon the lower parts of the stem and branches are well formed and numerous, while the flowers are still upon their summits, which generally occurs between the latter part of the 8th and the beginning of the 10th month. After being plucked its roots should be deprived of all extraneous matter by washing, and then carefully dried in the shade, in an *upright* position, as the seeds are liable to escape by the shrinking of the valves at the top of the capsule.

PROPERTIES.

Dry Indian tobacco has a slightly irritating odour, and when chewed, though at first productive of but little sensation, communicates a burning acrid impression to the posterior part of the tongue and fauces, very analogous to that produced by the common tobacco; and is attended also by the flow of saliva, and the nauseating effects upon the stomach, so characteristic of that plant. It yields its virtues to water, alcohol and ether, but owing to the solubility of the fatty

matter in the last, it is not fit to be used as a menstruum. The only officinal preparation is the tincture, which is made by macerating two ounces of the dried plant, in one pint of diluted alcohol, for fourteen days; at the expiration of which time it should be filtered. An infusion made by digesting an ounce of the dried plant in a pint of water at 120° Fah., for two hours and strained, possesses its active properties. It should be expressly understood that in making those preparations of Lobelia which require heat, the temperature must not be greater than 160° Fah.; as the acrid principle upon which their activity depends, is more or less destroyed by greater increments of heat.

This plant loses 45 parts out of 64 in drying, or about seven-tenths. Its pulverization is attended with difficulty. The Thomsonians have four preparations of it, viz: first, the powder; secondly, a saturated tincture of the green leaves and capsules; thirdly, a compound tincture of the seeds, and some other articles, and fourthly, a vinegar.

MEDICAL HISTORY.

A difference of opinion prevails respecting the medical properties of this plant.

From the general observations of physicians it is emetic, diaphoretic and expectorant, and also possessed of narcotic, and occasionally of cathartic, powers. According to Dr. Cutler, when the leaves and capsules are chewed for some time, they produce giddiness in the head, and general tremors, followed by nausea and vomiting. When given in the full dose, it produces speedy and severe emesis, accompanied by distressing nausea, copious sweating, and great prostration. It has been said that over doses cause extreme prostration, great anxiety and distress, and ultimately death preceded by convulsions. When administered as an injection it produces the same effects. Its principal use has been in spasmodic asthma, though it has been found useful in catarrh, croup, pertussis and other pectoral affections. Dr. Cutler, upon whose recommendation this remedy was admitted into regular prac-

tice, states, in a communication to Dr. THATCHER, that he had been afflicted with spasmodic asthma for ten years, and was entirely relieved of it, by a tincture of this plant, made by himself, of which he took a table spoonful every ten minutes, until slight vomiting was produced; which occurred with the third dose. (BARTON's Botany.) Dr. RANDAL observes that he has administered the Lobelia inflata to many persons of various ages suffering from asthma and catarrh. In the former he has found it to relieve the paroxysm in a short time, and restore the patient to quietude and ease, when given in doses of a fluidrachm of the tincture several times repeated. In the latter, when administered in small and frequently repeated doses it has operated as a sure and speedy expectorant, producing effects of the most important character, very analogous to those of antimony and squills.

The Doctor also remarks, that he has not observed any narcotic effects from its use when given in small doses.

Lobelia inflata is generally considered by the medical writers of the day as an acrid narcotic, possessed of poisonous properties, and capable of producing death when taken in over doses, if not speedily evacuated from the stomach. On the contrary the Thomsonians assert that its administration is attended with no narcotic or cathartic effects, that the unpleasant symptoms of anxiety, &c. can be attributed to other causes; and that it is not poisonous. But their opinion respecting its narcotic effects is no doubt founded in their ignorance of the true application of the term, believing that to be a narcotic, it must positively have a soporific action on the system—hence their error. I have been informed by persons entirely disinterested, as respects Thomsonianism, that they have derived and observed very beneficial effects to result from its use as an emetic, in a variety of instances.

Lobelia inflata can be administered as an emetic in substance, of which the dose is from 10 to 20 grains; as a tincture of which the full dose is half a fluid ounce: and as an infusion of which a wine glassful may be given and frequently repeated.

CHEMICAL HISTORY.

The subject under consideration, is one of those which has attracted but little attention from analytical chemists, and with the exception of one or two instances, no attempt has been made, as far as I have been able to learn, to ascertain its constituents, and determine their several properties. It was with this view that the following experiments were undertaken, for the assistance of which, choice specimens of the plant were selected.

Experiment 1.—A saturated decoction was precipitated of a dirty yellow colour by the subacetate of lead, and of a grayish white by the protonitrate of mercury. This precipitate when dry was of a dark iron gray colour and was changed to a deep red brown by nitric acid. A portion of it was introduced into a tube retort, and heated to redness, when globules of mercury were condensed in the receiver, and carbonaceous matter left in the retort.

The decoction was not affected by tincture of iodine, solution of gelatin, or the carbonates of soda, and ammonia, and the sulphate of zinc.

Experiment 2.—Another portion of the saturated decoction was digested with hydrate of alumina for twenty-four hours, having previously been decolourized by animal charcoal, filtered and evaporated to one-half. In this state it changed the blue colour of litmus to red, caused a deep yellow brown precipitate with lime water, and a blackish one with the protosulphate of iron.

Experiment 3.—A portion of Lobelia inflata was submitted to the action of water at 160° Fah. for 10 minutes, when a portion of the infusion was removed; the temperature was then raised to 180° Fah., for 5 minutes, and another portion abstracted: additional heat was then applied until 200° was attained, and a third portion removed, after which the temperature was carried to 212°. Upon comparing the results, that first obtained had acquired the least colour but was the most acrid, and just in proportion as the temperature had been

raised the colour deepened and the acrimony diminished until when boiled it possessed less of the latter than either of the infusions. The increments of heat were ascertained by a thermometer suspended in the liquid during the operation.

Experiment 4.—A saturated tincture was submitted to distillation in a glass retort. The product was colourless, having the odour of the tincture without its acrimony, and upon evaporation yielded no residuum. It was probably alcohol holding a portion of a volatile oil in solution.

Experiment 5.—Another portion of the plant was subjected to distillation, in a metallic still, with sufficient water to prevent empyreuma: the distilled liquor had a strong odour of lobelia, but was void of taste. This was returned into the still and another portion of the plant added, and again drawn over.—The last product had a more powerful aroma, from which circumstance, the presence of a minute portion of volatile oil may be suspected.

Experiment 6.—Half a pound of the green plant was digested in one pint of water, acidulated with one drachm of sulphuric acid for four days; then decanted, saturated with magnesia, and filtered. The infusion thus obtained had a very acrid taste, and was of a dark red brown colour. This was submitted to distillation in a retort by the aid of a sand bath. The product had a strong odour of the plant, but was perfectly tasteless, and upon examining the liquid remaining in the retort, it had no acrimony except that which was given to it by the sulphate of magnesia, resulting from the saturation. This experiment was repeated, except that hydro-chloric acid was substituted for the sulphuric, with a like result.

Experiment 7.—A saturated tincture, made with alcohol at forty BAUME, was precipitated greenish white, upon the addition of water, and had the properties of a resin.

Experiment 8.—Dry lobelia was submitted to the action of sulphuric ether, at sixty BAUME, for twenty-four hours, which, upon decantation, and evaporation, yielded a dark green viscid mass, which was treated with alcohol to remove

the resin. The residue had an unctuous feel, oily odour, and slightly acid taste. This substance left a greasy stain on paper, and inflamed readily, giving off black sooty smoke. It was then dissolved in a solution of potassa, with which it formed a saponaceous compound, as on the addition of muriate of lime, it gave the usual characteristic of soapy solutions.

Experiment 9.—Two ounces of the plant were treated according to the process for obtaining emetia, but without a satisfactory result.

Experiment 10.—Half a pound of the green plant was digested in one pint of water, acidulated with one drachm of concentrated acetic acid, for sixty hours, at a temperature of 70° Fahrenheit; after which it was subjected to decantation and expression.

This liquor, of which twelve fluid ounces were obtained, was saturated with pure magnesia, and filtered, when it was of a dark red brown hue, and had a very acrid taste. It was then treated with successive portions of sulphuric ether, at sixty BAUME, until its acrimony was entirely removed.

The ether, after separation from the infusion, had a gelatinous consistence, owing, probably, to the presence of water, and some other matter.

To the ethereal liquor thus obtained, a small quantity of the chloride of calcium was added and the mixture agitated, to separate the water, and the ethereal solution obtained pure and colourless. This, upon evaporation, yielded a small portion of brown transparent matter, of the consistence of thick honey, having an intensely acrid taste, a strong, somewhat aromatic odour, with a decided alkaline reaction on reddened litmus paper.

Experiment 11.—An ounce and a half of the dried seeds of Lobelia, were digested in eight fluid ounces of water, acidulated with half a drachm of concentrated acetic acid, for thirty-six hours, decanted, filtered, and saturated with pure magnesia, and again filtered. The liquor thus obtained was transparent, of a dark olive green colour, of specific gravity 1.01, and possessed of great acrimony. It was then treated

with sulphuric ether, at sixty BAUME, as in the last experiment, which, after agitation with carbonate of potassa to remove any aqueous matter which might adhere, was evaporated. The product was of a light brown colour, having all the properties characteristic of that in experiment 10. This is undoubtedly the active portion of the plant, and from its alkaline nature, deserves the title of *Lobelina.*

Lobelina is of a light brown colour, has the consistence of thick honey, a strong, somewhat aromatic odour, and a highly acrid, burning, nauseous, taste, which is very permanent and irritating, to the throat. It is soluble in water, very soluble in alcohol and ether, and slightly soluble in the fixed oils and turpentine. Its specific gravity is rather more than that of water, as it sinks slowly in that fluid. *Lobelina* has a decided alkaline reaction, saturates acids, and with them forms crystallizable salts. All its combinations with acids are void of odour, and in the plant it is most probably combined with gallic acid. When a small quantity is put upon the end of a glass rod, and a lighted taper applied, it inflames (though not very readily,) giving off copious white smoke.

Experiment 12.—*Lobelina* was combined with sulphuric, nitric, hydro-chloric, acetic, tartaric, oxalic, and gallic, acids, with all of which it formed crystallizable salts, except the acetic.

The sulphate is in granulated crystals, appearing through the microscope of a prismatic form, possessed of all the acrimony of its base, but no odour. It is soluble in alcohol, and very soluble in water.

The nitrate crystallizes in flat tabular formations, is of a light brown colour, and has no odour, but is very soluble in water and alcohol. The muriate crystallizes in radiating needles of a yellow brown colour, and dissolves readily in alcohol and water.

The acetate does not crystallize, but remains in a dark brown syrupy form, and is more soluble in water than either of the others. This circumstance accounts for the fact, that diluted acetic acid is the best menstruum for extracting *Lo-*

belina, as the quantity yielded with this acid is greater than with the others. The tartrate, gallate, and oxalate, are also crystallizable, but owing to the small quantity acted upon, the crystals were very imperfect.

Experiment 13.—Six grains of the Indian tobacco were introduced into a small tube retort, to which a receiver was adapted, and from the receiver a glass tube, of suitable form and dimensions, was so placed as to conduct the gaseous matter under a graduated inverted glass, filled with water. Heat was then applied to the retort, until all the volatile matters had passed over. In the receiver was found two grains of a dark brown oleaginous matter, and in the graduated glass 2.428 cubic inches of gaseous matter, having an excessively fetid odour, of which .906 cubic inches was carbonic acid, as proved by agitation with lime-water, and calculating from the absorption. After the removal of the carbonic acid, the residual gaseous matter inflamed on the application of a lighted taper, and burned for a few seconds with a bluish flame, where in contact with the atmosphere. The oleaginous matter as above procured, is insoluble in water, but very soluble in alcohol, ether, and the volatile oils. It is not affected by nitric, and hydro-chloric acids, but is converted into a soluble substance, by the caustic alkalies. Its specific gravity is .70059. Its odour is nauseous and penetrating, extremely like that of the oil of tobacco, and communicates to the breath an odour very much resembling that of a professed tobacco smoker. Its effects on the animal economy, however, are not similar to the last mentioned article. The properties of the oleaginous matter above mentioned, were ascertained from a quantity obtained expressly for the purpose.

Experiment 14.—Five hundred grains of Indian tobacco were incinerated, and twenty-four grains of ashes were obtained. These were treated with boiling water for five minutes, filtered and evaporated to dryness. The dry mass weighed two or three grains, was of a light gray colour, effervesced with acids, and restored reddened litmus paper to blue. This substance was saturated with nitric acid, and evaporated

to dryness, when the well known and characteristic crystals of nitrate of potassa presented themselves.

Experiment 15.—The exhausted residue of the experiment fourteen, was treated with nitric acid, which caused effervescence, afterwards diluted with water and filtered. This solution was precipitated white by the oxalate of ammonia, and deep blue by the ferro-cyanuret of potassium.

It may be inferred from the foregoing experiments that the principal constituents of the Lobelia Inflata are as follows, viz:

1st. Gum; 2d. Gallic acid; 3d. Volatile oil; 4th. Greenish resin or chlorophyle; 5th. A green, fixed, oily, matter; 6th. *A peculiar, alkaline, acrid principle;* 7th. Salts of lime, and potassa; 8th. Oxide of iron; and to these may be added Lignin.

From the foregoing observations, it will be seen that a marked analogy may be traced between *Lobelina* and Nicotina, the active principle of the Nicotiana tabacum. Its uncrystallizability, its loss of odour by acidifying combinations, its acetate being not crystallizable, and lastly the minute proportion it holds with regard to the plants, bulk for bulk, are some amongst other striking marks of their resemblance.

Judging from a variety of experiments, it can hardly occupy more than $\frac{1}{100}$th, weight for weight, while tobacco, according to BERZELIUS, yields but one part in a thousand. This remark applies more particularly to the plant as a whole, for the seeds contain, at least, twice the quantity.

The empyreumatic oil, as obtained in experiment thirteen, is so analogous in some of its sensible properties, to that obtained from tobacco, as still farther to warrant the belief of a similarity in chemical properties with that plant, though in a less concentrated form. Had the heat employed in its formation been more moderate and better regulated, there can be but little doubt that the product would have had a still more striking analogy.

It is a curious fact, that the agitation of ether with the in-

fusion, as in experiments ten and eleven, should communicate to it a gelatinous consistence. When exposed for evaporation it lost its consistence and became perfectly fluid.

ART. XIX.—REMARKS ON THE METHODS OF PREPARING IODIDE OF POTASSIUM. By Benjamin F. Hœckley.

(An Inaugural Essay.)

Of all the preparations of iodine, none has attracted more attention or been more extensively employed than the iodide of potassium. This arises, no doubt, from the numerous advantages which this preparation possesses over many of the other iodides. The principal of these advantages are the following:—It is not decomposed by exposure to the atmosphere; it is very soluble in water, and but slightly, if at all, deliquescent; its elements are not separated by heat, and it may readily be obtained in a state of purity. It is also the iodide generally used for procuring others which are insoluble.

The increasing demand for this article has induced me to examine into some of the processes which have been devised for procuring it in a state of purity.

This iodide is officinal in the United States and Dublin Pharmacopœias. The name given to it by the former, is Potassii Iodidum, and by the latter, Potassæ Hydriodas. The first is the more correct, since it is (at least when not in solution) an iodide, and not a hydriodate.

The process of the United States Pharmacopœia for preparing this iodide, is the same, in principle, as that recommended by Turner in 1825, and is as follows:

"Take of solution of potassa two pints; iodine a sufficient quantity. Apply a gentle heat to the solution, and add, by degrees, sufficient iodine to saturate the potassa, and to impart a brown colour to the liquid. Then pass hydro-sulphuric acid through the solution, in a proper vessel, till it loses its brown colour, and retains the odour of the acid. Filter through paper, and having poured hot water upon the residue, again filter. Boil the filtered liquors for a short time, that the hydro-sulphuric acid may be driven off; then, if sulphur has been precipitated, remove it, and saturate any acid that may be present with solution of potassa. Lastly, boil the liquor to dryness. Hydro-sulphuric acid is obtained from sulphuret of iron, by the addition of sulphuric acid diluted with four times its weight of water."

The rationale of this process, on the assumption that the iodide of potassium becomes hydriodate of potassa by solution, may be explained as follows. On adding iodine to a solution of potassa, water is decomposed; one atom of iodine unites with five atoms of oxygen, forming one atom of iodic acid, whilst five atoms of iodine unite with five atoms of hydrogen, forming five atoms of hydriodic acid; these acids, then, severally unite with the potassa, forming iodate and hydriodate of potassa. The proportion of the former salt to the latter, (adopting the atomic weights as given by TURNER,) is as 1423 to 5815, or as one to four and one-twelfth nearly. On passing hydro-sulphuric acid through a solution of these salts, it is decomposed, its hydrogen uniting with the iodine and oxygen of the iodate, forming hydriodic acid and water, whilst its sulphur is precipitated. The excess of iodine, which the solution at first contains, is at the same time converted into hydriodic acid, which is directed to be saturated with solution of potassa. The solution, having by these means been converted into one exclusively of hydriodate of potassa, when evaporated to dryness, yields iodide of potassium, in consequence of the hydriodate losing its oxygen and hydrogen.

If instead of adding an excess of iodine (as indicated by its

producing a brown colour in the liquid) just sufficient be added to neutralize the potassa, upon passing hydro-sulphuric acid through the solution, there will be no free hydriodic acid formed, and the subsequent addition of potassa will not be necessary.

One great objection to this process is the employment of hydro-sulphuric acid, which, besides the trouble and expense of forming it, has such an exceedingly offensive odour, as to make it desirable to dispense with it.

The formula adopted by the Dublin College is as follows:

"Take of iodine one part; sulphuret of iron, in coarse powder, five parts; sulphuric acid, seven parts; distilled water forty-eight parts; water of carbonate of potassa, a sufficient quantity; rectified spirit, six parts. Mix the iodine by trituration with sixteen parts of the water, and put the mixture into a glass vessel. Pour the acid, previously diluted with thirty-two parts of the water, on the sulphuret, contained in a matrass; and by means of a tube adapted to the neck of the matrass, and reaching to the bottom of the vessel containing the iodine and water, transmit the gas through the mixture, until the iodine entirely disappears. Filter the liquor, and immediately evaporate it, by a superior heat, to one-eighth part, and again filter it. Then gradually add as much water of carbonate of potassa, as will be sufficient to saturate the acid, which is known by the cessation of the effervescence. Then expose the mixture to heat, until the residual salt is dry and of a white colour. On this pour the spirit, and dissolve by the aid of heat. Lastly, from the remaining salt, pour off the solution, evaporate it to dryness, and keep the residuum in a close vessel."

The first step in this process is to obtain a solution of hydriodic acid. This is done by passing a stream of hydro-sulphuric acid through the water in which the iodine is diffused. The affinity of iodine for hydrogen being greater than that of sulphur for the same element, the acid is decom-

posed, its hydrogen unites with the iodine, and its sulphur is precipitated. The sulphur having been separated by filtration, the solution is evaporated to one-eighth part, and then again filtered. This second filtration is, however, unnecessary, unless there be a new deposition of sulphur, which, perhaps, is rarely the case. The hydriodic acid having been considerably concentrated, is neutralized with carbonate of potassa, and then evaporated to dryness. The residue is then dissolved in the rectified spirit, and again evaporated. This last operation is intended to remove any carbonate or iodate of potassa with which the previous product may have been contaminated.

This College directs a matrass to be used as the vessel in which the gas is to be generated, and the whole of the sulphuric acid to be poured on the sulphuret of iron at once; but a better way is to use a WOLFE's bottle, fitted with a safety tube, and a tube to convey the gas into the water containing the iodine. The sulphuret of iron and water having been introduced into the bottle, the sulphuric acid should be poured through the safety tube by small portions at a time. By these means we may avoid producing more hydro-sulphuric acid than would be necessary to form the hydriodic acid.

The formation of the hydriodic acid, the slow evaporation, and the solution in alcohol, render this process so troublesome and dilatory, that it is, perhaps, seldom employed.

Both Pharmacopœias direct the solution to be evaporated to dryness; but the article has a much better appearance when in crystals, in which state, also, it is not so liable to contain impurities or adulterations.

Another process which is recommended for procuring the iodide of potassium, is, first to form a solution of hydriodate of zinc or of iron, and then to precipitate the oxide or carbonate of these metals by a quantity of potassa or carbonate of potassa, exactly sufficient for combining with the hydriodic acid. The precipitate having been removed by filtration, the solution of hydriodate of potassa is evaporated to dryness or crystallized, as before. The greatest difficulty of this process

is to precipitate the whole of the oxide or carbonate of zinc or of iron, without having an excess of the precipitant. It is preferable, however, to have a slight excess of the latter, than that there should be an excess of either hydriodate of zinc or of iron. If potassa has been used as the precipitant, and there should happen to be an excess of this, the greater part of the iodide of potassium may be separated by crystallization. If the carbonate of potassa has been used, and there be an excess of this, the best mode of proceeding will be as follows:—Evaporate the solution sufficiently far to allow a part of the iodide of potassium to crystallize; separate these crystals and wash them with a small quantity of water; evaporate the remaining solution, together with the washings, to dryness; then dissolve the residue in alcohol by the aid of heat, and lastly, having poured off the clear solution from the insoluble portion, evaporate it to dryness or crystallize.

If the hydriodate of zinc or of iron be in excess, the iodide of potassium cannot be procured pure by crystallization; for in evaporating the solution, the hydriodates of these metals will be wholly or partly decomposed, and the crystals will be contaminated with the oxide of zinc or of iron, and perhaps, also, with free iodine. From these considerations it appears that carbonate of potassa is, on the whole, better adapted for forming the iodide in this way, than the pure alkali.

Another process which has been proposed for obtaining iodide of potassium, consists in adding to a solution of sulphuret of potassium, a sufficient quantity of iodine to precipitate the whole of the sulphur. By this means we obtain a solution of iodide of potassium which must be evaporated in order to procure the iodide in a solid state. For obtaining the iodide in this manner, it is necessary that the sulphuret of potassium should be perfectly pure, not containing any sulphate of potassa, an impurity always present when the sulphuret is prepared as directed by the Pharmacopœias. The labour and cost of forming a pure sulphuret, by the decomposition of sulphate of potassa would render this process less eligible than some of the former methods.

The last process which I shall notice is that described by TURNER, in the fifth edition of his chemistry, and is as follows: "add iodine to a hot solution of potassa until the alkali is neutralized, when iodide of potassium and iodate of potassa will be generated; evaporate to dryness, and expose the dry mass in a platinum crucible to a gentle red heat, in order to decompose the iodate. Then dissolve out the fused mass by water and crystallize."

The rationale of the action of iodine on potassa has already been given, on the supposition that the iodide of potassium becomes hydriodate of potassa by solution. If, however, it is supposed that the iodide of potassium exists as such in solution, the rationale will be somewhat different and may be explained as follows:—Five atoms of iodine unite with five of potassium, forming five atoms of iodide of potassium, while the five atoms of oxygen derived from the potassa, unite with one of iodine, forming one atom of iodic acid, which unites with an atom of potassa, forming iodate of potassa. The proportion of the iodide to the iodate, according to these views, is as 1423 to 5515 or as 1 to $3\frac{6}{7}$, nearly.

BERZELIUS recommends that the iodate of potassa be separated from the solution by crystallization, and that the mother water containing the iodide, be evaporated to dryness and fused, as before. The separation of the iodate is intended to prevent the mass from bubbling up and throwing portions of it out of the crucible.

Of the different processes noticed, this last appears to be decidedly the best, being the most simple and easy of execution.

It has been said, that "iodide of potassium is partially decomposed by sulphuric ether. In digesting iodide of potassium, in this menstruum, it becomes highly coloured with a portion of iodine, which separates from the salt; the iodine attaches itself to the sides of the vessel, at the surface of the liquid; what remains after pouring off this liquid, appears to be a subiodide of potassium." I have repeated this experiment without obtaining any indications of the decomposition of the iodide.

Iodide of potassium is generally stated to be deliquescent, but this is the case only when the air is extremely moist. The iodide, as it is found in commerce, is generally in the form of opaque cubic crystals of a white colour, which decrepitate when heated. A solution of the iodide, when allowed to evaporate spontaneously, deposits crystals which are perfectly transparent and colourless.

Iodide of potassium consists of one equivalent of iodine 126.3, and one of potassium 39.15 = 165.45.

One hundred parts of water, at the temperature of 64°, dissolve 143 parts of the iodide.* It is soluble in one-half its weight of water at 212°. Alcohol of specific gravity, .835, at the temperature of 60°, dissolves about one-eighth its weight; in boiling alcohol it is much more soluble.

Iodide of potassium is decomposed by sulphuric, nitric, and hydro-chloric acids; and by the salts of lead and of mercury.

The only officinal preparation of this iodide is the "Unguentum potassæ hydriodatis," of the Dublin Pharmacopœia.

* THENARD.

SELECTED ARTICLES.

ART. XX.—ON THE CHOICE OF FORMULÆ.—By M. D. G. Salles, Pharmacien.

Among the innumerable formulæ contained in the most accredited Pharmacopœias and Formularies, a certain number are met with, which are every where generally in use; and in which it is admitted that perfect identity ought to exist; this, however, is far from being the case. It is only necessary to refer to the first pages of two or three Pharmacopœias to be convinced that very great differences exist in the composition of medicines which bear the same name. If these differences were always based upon the use to which the medicines are applied, or the doses in which they are administered in each country, and even in each locality, the subject would not call for observation. For example, it would not be more reasonable, to desire to force the people of the north, who generally bear alcoholic liquors well, to employ small doses of concentrated tinctures, as those of the French Codex, than to force upon the inhabitants of the middle regions, the adoption of the large doses of the less concentrated tinctures of the north.

It is then, not of differences of this kind that I intend to speak, but only of those which originate in bad translations, difference in weights and measures, or the caprice of authors, who suppose that they are doing more service by modifying the compositions of medicines in accordance with the opinions and theories of the day, than by presenting them *in the way*

that experience and time have proved them to be efficacious, —such as physicians are accustomed *to prescribe them and patients to employ them.* Generally, no regard is paid to the injury sustained by the art of pharmacy from these changes, and the serious inconveniences resulting from them in practice.*

It is for the purpose of directing the attention of pharmaciens and physicians to this important subject, that I now undertake to re-establish, in their integrity, several formulæ. I shall, in the present paper, confine myself to the *arsenical solution of Fowler* and the *wine of antimony*, to which I shall join as an appendix, the formula of the *pills of Plummer*,

* The following example may be given as corroborative of this statement. For a long time the sulphuret of antimony entered into the composition of a great number of ptisans, very much esteemed in old syphilitic, and cutaneous affections, (ptisans of Feltz, of Pollini, of Astruc, of Vinanche, &c.,) and in spite of those who pretended that the sulphuret of antimony yielded nothing to water, these ptisans produced numerous cures. When Serullas had proved that the sulphuret of antimony always contained a greater or smaller quantity of arsenic, it was held that it was of the highest importance only to employ antimony deprived of the sulphuret of arsenic, by means of ammonia. At present we render justice to our ancestors, and scrupulously prepare these ptisans as they did, with the sulphuret of antimony simply broken down, and with the aid of ebullition long continued, because we have discovered that the prolonged action of boiling water, transforms a part of the sulphuret of arsenic, contained in the antimony, into arsenious acid; and that this acid possesses very active medical properties in the treatment of certain syphilitic and cutaneous affections. One more reflection upon this subject. Within a few months, a skilful chemist has discovered the presence of arsenic in the sulphuric acid of commerce; the inference was consequently drawn by him that no acid should be employed for medical purposes, except that which was carefully purified, because this alone could be pure. But will it not be proper to ask him, if it is certain that the acid thus purified will produce the same curative effects when employed in diseases of the skin and especially when the medication may be continued during months or years? for then extremely minute quantities of an active medicine, repeated during so long a time, ultimately lead to results, which could never have been obtained by wishing to hasten the cure by larger doses, but continued for a shorter period. Let us consult experience in the first instance, and we may reason afterwards.

which appears to be the most rational, at the same time that it is most generally in use.

Arsenical solution of Fowler. Mineral liquor of Fowler. Liquor arsenicalis of the London Pharmacopœia.

The following is the London formula:—

"Take, of sublimed white arsenic, reduced to a very fine powder, of subcarbonate of potassa, from tartar, each sixty-four grains, of compound spirit of lavender, four drachms, of distilled water one pint. Boil the white arsenic and the subcarbonate of potassa, in a glass vessel, until the arsenic shall be entirely dissolved; add the compound spirit of lavender to the liquid when cold, and finally add a sufficient quantity of distilled water to make up the pint."

Let us investigate this. 1st. The sixty-four grains here directed are *Troy grains*, and they are equal to one drachm and $\frac{4}{60}$ of a drachm French weight, since the English drachm sensibly of the same weight as our own, is divided into only sixty grains, instead of seventy-two, and five English grains are equal to six metrical grains. Consequently seventy-seven metrical grains are equal to sixty-four grains *Troy*. 2d. The English pint, used in the shops, is divided into sixteen fluid ounces, the value of which, when aqueous fluids are concerned, as in the present case, hardly differs from the medicinal ounce, each of which contains 480 grains Troy. The liquor thus prepared contains, then, four English grains to the ounce, or $\frac{1}{120}$ of arsenious acid. 3d. The compound spirit of lavender of the London Pharmacopœia, is a true tincture of a deep red colour, prepared by infusing for fifteen days, in three English pints of spirit of lavender, and one of spirit of rosemary, half an ounce of cinnamon, half an ounce of nutmeg, and an ounce of red saunders. Hence it results that the liquor of Fowler almost possesses, in intensity, the smell, taste and colour of compound tincture of lavender, besides the taste peculiar to the arsenical salt which is formed.

All foreign Pharmacopœias, which contain the formula for Fowler's solution, give that of the London, filling up the pint (or octarius) to sixteen ounces in weight. These are, the

American Pharmacopœia, (Boston 1820,) that of Antwerp, (1812,) the Batavian Pharmacopœia, (1805,) that of Belgium, (1825,) those of Edinburgh, Hanover, &c. &c. Now in all these works, the division of the medicinal weights, is the same as in England, that is to say, the pound is divided into twelve ounces, the ounce into eight drachms, the drachm into three scruples, and the scruple into twenty grains, five of which are equivalent to six of the French. Further, without exception, all give under the name of compound spirit of lavender the London formula. Hence it results, most evidently, that every where Fowler's solution contains one hundred and twentieth of its weight of the oxide of arsenic, that it is of a beautiful red colour, and possesses the odour of lavender.

If we consult the formularies and treatises published in France, it will be found that the formula of London has been more or less literally translated, without having regard to the difference of weights, and that arsenic does not constitute but the hundred and forty-fourth part of the liquid, which is sometimes red, as that of Cadet and Ratier, at others colourless as that of MM. Henry and Guibourt who direct the tincture of lavender, although M. Guibourt has pointed out the difference in weight in the second edition of his Pharmacopœia, without having conformed to it. If we turn to the Codex of 1818, we will find, under the name of *Liquor of Fowler*, a solution containing the hundredth part of its weight of oxide of arsenic in place of the hundred and twentieth, colourless instead of being red, and exhaling the odour of melissa instead of that of lavender.

The authors of the Codex have, in truth, determined with great precision, how many drops of their solution are required to represent a grain of arsenic, but this does not prevent the occurrence of errors. Should a French physician desire to repeat experiments made elsewhere, with Fowler's solution, his first care will be to examine, how many drops of the solution he must administer to his patient in order to obtain the results indicated. Now it is evident, that if he does not

take into consideration the difference of the two formulæ, which is morally impossible in practice, he will administer to his patient one-sixth more of the oxide of arsenic. On the contrary, he will administer one-sixth less if the Fowler's solution which is directed in the formularies of Cadet, Ratier, &c., be employed. Between a sixth more and a sixth less, there is nearly the difference of a third, and certainly this is worthy of attention. So much as regards the physician. Is it necessary that I should now show, to how much inconvenience, the pharmacien will be exposed, who may dispense the colourless liquid of the Codex to foreign patients or physicians, or even to countrymen, who have previously made use of it abroad.

I propose then the following formula, which can be translated into all languages without altering the proportions. It forms exactly the $\frac{15}{16}$ of that of the London Pharmacopœia.

℞ —			
Sublimed arsenious acid	ʒi or 4	grammes or parts.
Carbonate of potassa	ʒi or do.	
Comp. tinct. of lavender	ʒiij or 12	
Distilled water	ʒxv or 480.	

Proceed, secundum artem, to obtain fifteen ounces, or 480 grammes or parts of the solution of which the oxide of arsenic will exactly make the hundred and twentieth part.

Antimonial Wine.

Formerly antimonial wine was prepared with glass of antimony or the *crocus metallorum*, but this practice has been renounced generally, since well executed experiments have demonstrated how much its strength is affected by the strength of the wine, and the continuance of the maceration. Almost every where it has been succeeded, by a solution of tartrate of potassa and antimony in Spanish wine, either pure or diluted with water, and designated by the name of improved antimonial wine, or, simply antimonial wine.

It would be as prolix, as fastideous, to exhibit all the variations which this formula presents. But of the large number, three, in particular, are more universally adopted than the

others, and which are incorporated into the best Pharmacopœias.

A. The London Pharmacopœia, that of the United States, (Boston 1826,) the American Formulary of Dr. Benjamin Ellis, (Philadelphia 1826,) direct a scruple of tartar emetic, four ounces of water, and six ounces of Spanish wine. As the medicinal weights are the same in the United States as in England, and as the drachm of the same value as ours, is only divided into sixty grains, it results that the scruple here prescribed is divided into twenty grains, and that each ounce of the wine contains exactly two Troy grains of tartar emetic. This salt makes the two hundred and fortieth part of it.

B. The Edinburgh, the Belgian, (Hague, 1823,) the Finland (Abo, 1819,) Pharmacopœias, those of Hanover (1823,) of Oldembourg, in Westphalia, (1801,) of Prussia, (Berlin, 1813,) prescribe twenty-four grains of tartar emetic to the pound of Spanish wine. Now, in all these countries the medicinal pound is of twelve ounces, and the grains have the same value as the English; this wine, then, still contains two grains of tartar emetic to the ounce, (of sixty to the drachm and of 480 to the ounce,) or the two hundred and fortieth part of its weight.

C. The Military Pharmacopœia of Prussia, (Koenisberg, 1823,) the Swedish Pharmacopœia (Stockholm, 1819,) direct two grains of tartar emetic to the ounce of wine. But as the grains are also sixty to the drachm, the strength of the wine is the same as in the preceding.

We understand, then, that these three formulæ (a scruple to ten ounces, twenty-four grains to the pound, two grains to the ounce,) apparently very different, are nevertheless one and the same; and as this is the one most generally used, it is desirable that it be admitted into the new Codex in the following form:—

℞ Tartrate of potassa and antimony ʒi or one part.
℔ Malaga wine ℥x or 240 parts.
Dissolve and filter.*

* The United States Pharmacopœia, (1831,) has adopted this formula; its advantages may be learned from the U. States Dispensatory.

N. B. The formula of the Codex, 1818, is not in use in the shops. Antimonial wine is generally made with two grains of tartar emetic to the ounce of Malaga wine. This is an extremely convenient formula, as regards the dose of the tartar emetic, but, at the same time, the salt makes only the two hundred and eighty-eighth part, and when dispensed —in accordance with the directions of foreign physicians— the strength of the medicine diminishes in the ratio of six to five.

Plummer's Pills.

The Codex contains no formula for the pills of Plummer, yet this preparation is admitted into a great number of Pharmacopœias, and French physicians prescribe it very frequently. It appears to me of more consequence to insert the formula into the new Codex, as it is one of those which present a greater number of variations.

Many authors make a distinction between the *simple* and *compound* pills of Plummer, by designating, under this last name, those containing the resin of guaiacum, while they appropriate the name of *simple* pills to those into which enters the extract of fumitory, of gentian, or liquorice, &c.; as the one preparation is not less compound than the other, and as physicians never prescribe *simple* or *compound* pills, but only Plummer's pills, the best practice is to choose the formula most in use, and which in addition, affords a medicine least alterable and most efficacious. That of the London Pharmacopœia appears to merit preference in all these particulars; it is as follows:

(*Dr. Plummer's Pills.*) *Pilulæ hydrargyri submuriatis compositæ.* L.

℞	Calomel		
	Golden sulphur of antimony	*aa*	ʒij
	Powdered resin of guaiacum		℥ss
	Alcohol		q. s.

Triturate the calomel with the golden sulphur of antimony, then with the guaiacum, and, finally, add the alcohol to give the proper consistence. This mass is most frequently divided in pills of two grains each, sometimes of three grains, and rarely four; care must be taken, when a foreign order is executed, so as not to divide each drachm into more than thirty, twenty, or fifteen pills, as they may be desired to be of two, three, or four grains each.*

This formula appears preferable to others:—1st. Because it is the one most used, (London, Dublin, Edinburgh, America, &c.) 2d. Because guaiacum possesses properties, even in small doses, well adapted to produce the effect desired from these pills, which the extract of liquorice has not; and the effect of a few grains of the extract of fumitory is extremely doubtful. 3d. Because the alcohol forms, with the resin, a solution which dries rapidly, and which has the double advantage of easily uniting the mass, preserving it from humidity, and preventing all ulterior reaction.† 4th. Because it is the most convenient formula, the best proportioned and most easily prepared extemporaneously, since to obtain any amount whatever of the mass, it is easy to take one-fourth of the quantity of calomel, one-fourth of golden sulphur of antimony, and one-half of the guaiacum, without regarding the alcohol,

* The following recipe is that given in Thatcher's Dispensatory, and employed by some apothecaries in the City of Philadelphia:—

Pilulæ Plummeri.

℞ Antim. sulph. præcip.
Hyd. mur. mitis. *aa* ʒiij.
Extract Gentian.
Sapo. Cast. *aa* ʒj.

Let the mercury be triturated with the sulph. præcip., then add the extract and form a mass with jelly of soap.—Ed.

† Lately mucilage of gum arabic has been prescribed, but the mass is very difficult to unite, and the moisture of the mucilage, disposes the calomel and golden sulphur of antimony to react upon each other, which it is of the greatest importance to obviate, as has been shown by M. Guibourt.

which evaporates during the preparation of the pills. These pills do not differ from the compound depurative powder of Plummer. *Journ. de Pharmacie.*

ART. XXI.—NOTE UPON THE PREPARATION OF SIMPLE PLASTER.* By M. A. Gelis.

All chemists agree in stating that the simple plaster of pharmaceutists is a compound analogous to salts. M. Chevreul in his treatise upon fatty bodies, says: "The operation of saponification, thus generalized, shows that the preparation of plaster with litharge is a true saponification, the oxide of lead having the same action upon fat as potassa and soda. Hence it follows that, strictly, plasters can be prepared with saponified fat obtained from an alkaline soap—but before so doing, it is necessary to determine if, in the plaster which it is desired to imitate, there exists a proportion of fat not acidified, so that if this is really the case, this proportion of non-acidified fat may be added to that which is saponified before uniting with it the litharge."

I might easily multiply these quotations, for all who have written upon this subject have taken the same view of the

* The simple plaster of the Codex, corresponds to the Emplastrum Plumbi of the U. S. Pharmacopœia. In the latter work olive oil alone is directed in the proportion of 1 gallon to 5 pounds of litharge and 2 pints of water; in the former we have the following formula.

Take of finely powdered litharge,
olive oil,
lard, ää lbs. iij.
M. water, quantum suf.

For an exposition of the views entertained at present by chemists upon the changes which these substances undergo in the process by which they are enabled to react upon each other, we refer to the U. S. Dispensatory.

Ed.

case. But no one, as far as I know, has carried the examination further. It appears sufficient to state, that it may be possible to obtain the simple plaster in a different way from the ordinary method, without seeking to ascertain if any advantage would accrue, and if it were not practicable to introduce into practice a ready and easy preparation, in the place of the tedious and disagreeable manipulation which is in use at this time.

Now it appears to me that a note which would have the effect of attracting attention to this subject, would not be entirely destitute of interest, and it is under this belief that I risk the publication of the results of my experiments.

Having dissolved a pound of white Marseilles soap in a sufficient quantity of warm water, I added to the solution 8 ounces of acetate of lead. As soon as the mixture occurred decomposition took place and the plaster floated upon the surface of the liquid, which then became completely transparent. This liquid was not rendered cloudy by sub-acetate of lead, and sulphuretted hydrogen produced but a little abundant precipitate. Having separated it, I washed the plaster, in order to rid it of the soluble salts which it might contain, after which I mixed it, and formed it into rolls.*

Thus obtained, it possessed an extreme whiteness, not to be obtained in the ordinary way. It softens perfectly in warm water, and mixes with great facility. And it does not become coloured as it grows older, which circumstance I attribute to the complete saturation of the acids of the fat; very different in this respect from the other, which always becomes more or less coloured.

It had only one defect. Some hours after its preparation, it assumed a consistence almost too firm, which, however, it but slightly communicated to the compounds into which it was introduced.

It has been said that the simple plaster, although obtained

*This mode of proceeding in the formation of this plaster, was suggested by Mr. Durand, of Philadelphia, in a note upon Ceratum Saponis, published in Vol. VIII., No. I. of this Journal. Ed.

by a chemical process, is prepared with quantities of fatty substances and litharge, which are not in accordance with the proportions proposed for the formation of a definite salt, and theory suggests that a certain quantity of the fatty substances is not acidified, but exists in the state of simple mixture. Nevertheless, the want of success always attending the attempts I have made to mix fatty substances with the plaster obtained by double decomposition, even in small quantities, has induced me to think, that this excess of fat does no remain free, but enters into some state of combination, whether, during the operation, there may be formed at the same time a neutral salt and an acid salt, which theoretically cannot be explained; or whether the salt of lead may be accompanied with an oleostearate of glycerine, which has been studied by MM. Pelouze, and Liebig. However this may be, as I think that the simple plaster has not, of itself, well marked medical properties and that it rather affords a vehicle for the application of substances which it is the practice to associate with it, and that the end which I have proposed, is to procure a compound, the physical characters of which will be absolutely similar to those of the plaster obtained by the ordinary method; I endeavoured in the first instance, to obtain the same consistence, by incorporating with my plaster different quantities of fatty substances, but as I have stated before with unsuccessful results. Even olive oil, in very small quantity, afforded me a product entirely devoid of pliancy, and becoming strongly coloured by the light. Besides the same defect, lard communicated to the plaster a degree of rancidity. I then employed fatty acids, which mixed perfectly well. The plaster, which contained one-eighth of its weight of them, lost none of the properties which it possessed, and acquired a consistence entirely similar to that of the plaster obtained by the direct action of litharge upon fatty substances.

I think, then, that by the method which I have proposed, a product will be obtained as cheaply, of greater beauty, and more easily preserved; and, moreover, considerable economy of time will result from the method. 1st. The primary

materials being furnished, the one by a crystallized salt, the other by an article of commerce, always constant in its composition, there will be no necessity of testing them. 2d. Because the duration of the operation will never exceed the time necessary for the solution of the soap. Finally, because the chances of loss are less, since the plaster, from remaining but a few minutes upon the fire, can neither boil over or be burned, as sometimes happens, when, in pursuing the ordinary method, it is forgotten to add water.

Preparation.

℞	Marseilles soap, in slices,	lbj.
	Warm water	lbij.
	Dissolve, and add to the solution	
	Crystallized acetate of lead	ʒviij.

Stir the mixture slowly, with a wooden spatula, until the liquid becomes transparent. Decant, re-wash the plaster, and, after having worked, form into rolls. Each roll should weigh one pound.

If it be desired to increase the quantity of the plaster, add two ounces of fatty acids to the pound. I have obtained these fatty acids by decomposing four ounces of the same soap by four drachms of sulphuric acid, diluted with three or four ounces of water.

From the plaster thus prepared, all the compound plasters may be formed, according to the ordinary formulæ.

But the very slight difference which exists between the compounds prepared from the plaster without addition, and that to which the fatty acids have been added, induces me to suppose, that the same result would be obtained, by increasing the amount of the wax or oil entering into these preparations.*

Journal de Pharmacie.

* The Committee of the Society of Pharmacy of Paris, to whom was referred the above essay, composed of MM. Chevalier, Lecanu, and Felix Boudet, reported favourably of the process recommended.

ART. XXII.—ACTION OF RE-AGENTS UPON THE SOLUTIONS OF THE DIFFERENT SPECIES OF CINCHONA OCCURRING IN COMMERCE.* By E. F. Anthon.

The author has devoted much attention to the species of cinchona as they occur in commerce. They were subjected to examination by employing always an infusion of the same strength. One part of bark cut into small pieces was digested with 4 parts of distilled water, allowed to stand at rest for 12 hours, filtered, and then exposed to the action of re-agents. The re-agents employed were the following: 1. Pure ammonia, diluted with pure distilled water to the specific gravity .990; 2. pure hydrate of potash, dissolved in distilled water diluted to the specific gravity of 1.080; 3. carbonate of potash, from bitartrate of potash, disolved in 8 parts of water; 4. iodide of potassium, in 6 parts of water; 5. binoxalate of potash, in 8 parts of water; 6. pure sulphate of soda, in 6 parts of water; 7. pure sulphate of copper, in 12 parts of water; 8. fresh-formed sulphated protoxide of iron, in 6 parts of water; 9. subacetate of lead, a mixture of 6 parts pure acetate of lead with 3 parts of fine scales, and 21 parts distilled water; 10. pure neutral acetate of lead, in 8 parts of water; 11. a saturated solution of pure corrosive sublimate; 12. pernitrate of mercury, by dissolving pure oxide of mercury in boiling nitric acid, diluted with 8 parts of water; 13. subnitrate of mercury, by digesting pure mercury with dilute nitric acid; 15. a saturated solution of tartar emetic, previously purified by crystallization; 16. pure crystallized nitrate of silver, in 16 parts of water; 17. pure sublimed chloride of iron, in 8 parts of water; 18. recently formed muriate of iron, in 8 parts of water; 19. saturated solution of nitrate of barytes; 20. sulphuric acid, specific gravity 1.090; 21. muriatic acid, specific gravity 1.030; 22. infusion of galls, by digesting 1 part of coarsely powdered galls with 4 parts of hot water, and filtering; 23. alcohol of

* Pharmac. Central-Blatt., July, August, 1836.

specific gravity 0.800; 24. lime dissolved in 12 parts of water. The species are named according to the nomenclature of Martius.

CINCHONA RUBRA.

1. *Properties of the Infusion.*—Almost colourless; faintly wine-yellow; passing readily through the filter, with a weak smell of tan, and strong bitter astringent taste.

2. *Ammonia.*—Reddish, gelatinous, flocky precipitate, soluble in excess; after standing from ¼ to ½ hour, passing into pink; and after 24 hours, occupying ½ of the bulk of the solution; the supernatant liquor clear, brownish red.

3. *Potash.*—Same as ammonia; only the precipitate is less voluminous and lighter coloured.

4. *Carbonate of Potash.*—Like the ammoniacal precipitate; the precipitate after 24 hours occupies only ⅙ of the bulk of the liquid.

5. *Iodide of Potassium.*—Fine divided white flocks, forming in ½ an hour larger flocks, which after 24 hours still continue to float.

6. *Oxalate of Potash.*—Strongly a white turbidness, becoming flocky in half an hour.

7. *Sulphate of Soda.*—No precipitate.

8. *Sulphate of Copper.*—The same.

9. *Sulphate of Iron.*—Pure light green colour, still clear after 24 hours.

10. *Subacetate of Lead.*—White gelatinous precipitate, after 24 hours occupying half of the bulk of the solution.

11. *Acetate of Lead.*—Strong white turbidity, quickly forming flocks, occupying in 24 hours from ¼ to ⅓ of the bulk of the fluid.

12. *Chloride of Mercury.*—White turbidness, quickly forming numerous flocks, occupying after 24 hours from ¼ to ⅓ of the bulk of the fluid.

13. *Pernitrate of Mercury.*—Yellowish white turbidness becoming fine flocks in ¼ of an hour; in 5 or 6 hours settling into a yellowish brown gelatinous precipitate.

14. *Nitrate of Mercury.*—White turbidness quickly forming fine flocks, settling in ½ an hour into a light greenish brown precipitate; occupying, after 24 hours, ¼ of the bulk of the fluid. Supernatant liquor straw yellow, clear.

15. *Tartar Emetic.*—Copious white turbidity, quickly forming white flocks, and after 5 or 6 hours a white gelatinous precipitate, occupying in 24 hours ½ of the bulk of the fluid.

16. *Nitrate of Silver.*—After ½ an hour, copious white turbidness; after 24 hours, flocky brownish gray precipitate.

17. *Chloride of Iron.*—Pure light green colour; clear after 24 hours, granular flocky, brownish gray sediment; supernatant liquor, clear and light green.

18. *Chloride of Tin.*—White turbidness; after ¼ of an hour flocks; after 24 hours occupying ⅛ of the bulk of the liquid.

19 to 21. *Nitrate of Barytes, Sulphuric and Muriatic Acids.*—No change.

22. *Infusion of Galls.*—Slight turbidness; after 2 hours fine flocks; after 24 hours a yellow sediment.

23. *Alcohol.*—No change.

24. *Lime.*—Copious white turbidness; in ½ an hour yellowish white flocks, then a gelatinous sediment.

CINCHONA FLAVA DURA.

1. Light-wine-yellow, easily passing through the filter, bitter, astringent, strongly acid reaction.

2. Light brown; in 24 hours clear.

3 and 4. Action the same as that of ammonia.

5. At first no change; in half an hour a brown colour without turbidness.

6. White turbidity; in a few hours a granular flocky white sediment.

7 and 8. No change.

9. Light yellow colour; after 24 hours still clear.

10. Copious white turbidness; in one hour a sediment, which in 24 hours occupies a quarter of the bulk of the liquid.

11. Like the subacetate of lead.

12. Turbid; in two hours reddish flocks.

13. Yellowish white turbidness; in a quarter of an hour dirty-reddish yellow gelatinous flocks, which occupy in 24 hours half of the bulk of the liquid.

14. Yellowish white turbidness; in a half an hour or three quarters, a yellow gelatinous sediment, which in 24 hours occupies one-fifth of the bulk of the fluid; the supernatant liquor clear, pure bright yellow.

15. No change.

16. Slight turbidness; in 3 or 4 hours the light brown flocks become darker.

17. Greenish brown colour; still clear after 24 hours.

18. Copious white turbidness, in a few minutes flocks; in half an hour a gelatinous sediment, which in 24 hours occupies one-eighth of the bulk of the liquid.

19. Scarcely any muddiness; in 2 hours light reddish flocks.

20 and 21. No change.

22. Turbidness; in 2 or 3 hours light reddish brown cheesy flocks.

23. In 24 hours scanty gelatinous flocks.

24. No change.

CINCHONA FLAVA FIBROSA.

1. Light wine yellow, readily passing through the filter; smells weakly of tan; taste slightly bitter, astringent; reaction acid,

2. Yellowish white turbidness; soluble in the smallest excess, leaving a yellow colour; in 4 hours the liquid becomes brownish red.

3. The same.

4. Yellowish white turbidness; precipitate soluble in an excess, leaving a pure yellow colour; in an hour the colour changes, as with ammonia.

5. At first no precipitate; after an hour a yellowish red turbidity; in 5 or 6 hours reddish flocks form a sediment.

6. At first no change; in a few minutes whitish turbidness; in 24 hours reddish flocks form a sediment.

7 and 8. No change.

9. Lively green colour, clear; in an hour slightly turbid; in 4 or 5 hours greenish black flocks; the supernatant liquor clear green.

10. Flocky light yellow precipitate; in half an hour a sediment: supernatant liquor whitish, turbid.

11. Flocky dirty reddish white precipitate; in one-half to three-quarters of an hour large gelatinous flocks; supernatant liquor clear, colourless.

12. Copious whitish turbidity; speedily fine flocks, in half an hour subsiding, and in 24 hours occupying one-third of the bulk of the solution; supernatant liquor clear, colourless.

13. Much yellowish red brown turbidness; speedily fine flocks; in half an hour a sediment, which in 24 hours occupies half the bulk of the liquid; supernatant liquor clear, colourless.

14. Copious yellowish white turbidness, speedily fine flocks; in three-quarters of an hour to one hour a sediment, and a brown colour in 24 hours occupying one-third of the space of the liquid; supernatant liquid clear, somewhat yellowish.

15. Much turbidity; in a few minutes whitish flocks; in an hour a sediment, which in 24 hours occupies one-half of the bulk of the liquid; supernatant liquid clear, colourless.

16. At first no change; in a quarter of an hour a violet blue colour; subsequently, a turbidness; in 3 hours brown flocks.

17. Greenish brown colour, clear; in half an hour turbid; in 5 or 6 hours greenish black flocks, forming a sediment.

18. Much turbidness; in a few minutes fine flocks; in half an hour a gelatinous yellowish white sediment; supernatant liquid whitish, turbid.

19, 20 and 21. No change.

22. Large cheesy dirty light yellow flocky precipitate.

23. No change.

24. At first no change; in 1 or 2 hours slight turbidness; in 24 hours flocks becoming a light red sediment.

ART. XXIII.—ON THE SOURCES AND COMPOSITION OF GAMBOGE, WITH AN EXAMINATION OF SOME ANALOGOUS CONCRETE JUICES.

By Robert Christison, M.D., Professor of Materia Medica in the University of Edinburgh.

(*Read before the Royal Society of Edinburgh, March* 7, 1836.)

This memoir is published in Sir W. Hooker's Companion to the Botanical Magazine, a work which has long been eminent for the value of its contents, and which, first conducted by Mr. Curtis, is the oldest of all the botanical periodicals in this country. As it is the oldest, so also it is the best. While perusing the admirable article of Dr. Christison, we received the thirteenth number of the Madras Literary and Scientific Journal, (a work of great merit,) for which we are indebted to the kindness of the Editor. It contains a paper by our friend Dr. Wight, relative to the plant which affords the Gamboge, from which we will present our readers with the knowledge of botanists upon this subject. Dr. Wight and Mr. Arnott, in their Prodromus of the Botany of India, have stated that the *Xanthochymus ovalifolius* is the plant from which gamboge exudes. Dr. Graham, of Edinburgh, in a letter to Dr. Wight, affirms that the plant is "undoubtedly the *Garcinia* (*Mangostana*, Gœrt.) *Morella* of Desrousseaux and Gœrtner. Arnott now thinks it *Garcinia Zeylanica*." Graham conceives that the *Garcinia Morella* is in reality no *Garcinia*, but a *Stalagmitis*, or rather it presents the type of a new genus, which he proposes to term *Hebradendron*. The plant from which Dr. Graham draws these conclusions is, according to Dr. Wight, an exotic in Ceylon, having been found by Colonel Walker near a Dutch fort, and being of very rare occurrence. It is the gamboge of this tree which Dr. Christison appears to have examined, and which is quite different from common Ceylon gamboge. Dr. Wight leaves the question undetermined, but throws out some important

suggestions, which are well worth the attention of Indian botanists.

Gamboge was first brought to Europe by Admiral Van Neck, in 1603. He gave a specimen of it to Professor Clusius, of Leyden, under the name of Ghittaiemou.

In consequence of the poisonous properties of gamboge, it was long before it was introduced into the European pharmacopœias. Now, however, when cautiously employed, it is considered to be one of our safest active purgatives.

The finest gamboge is understood to come from Siam, being imported into England from China, by way of Singapore. The druggist distinguishes three varieties—*Pipe*, *Cake* or *Lump*, and *Coarse Gamboge*.

"Pipe gamboge, which is invariably the finest, has sold in the London market during the last eight years, at prices varying from 2s. 10d. to 5s. a-pound, exclusive of duty.* Cake or Lump Gamboge is sometimes very nearly equal in quality to the last, but is more commonly somewhat inferior, and, therefore, sells for at least three-pence a-pound less. The two qualities are sometimes mixed in the same packages; sometimes each package contains but one; and frequently, on the other hand, the cases contain not merely Pipe and Cake Gamboge, but likewise more or less of a very inferior sort, by the presence of which the price is materially affected. This inferior sort again, of which there are probably many varieties confounded together in the rude nomenclature of the English drug-market, under the name of *Coarse* Gamboge, and which will be seen presently to be nothing else than a *Cake* Gamboge, of low quality, often constitutes the entire contents of the package. In its crude state this is quite unfit for the purpose of the painter, and is equally rejected for medicinal use; and consequently it bears so contemptible a character in the market, as to bring scarcely 10d. a-pound, when the other sorts are worth three or four times as much. For this state-

* Martin's History of the British Colonies, i. 224. Table.

ment I am indebted to Mr. Stead, an extensive and experienced wholesale druggist in London."

Dr. Christison states that there is no gamboge exported from Ceylon to Europe; but is it not possible, as it is common about Madras, according to the evidence of Drs. Ainslie and Wight, that it may be imported by another channel?

Dr. Christison has ascertained that gamboge is also produced in the Island of Borneo, on the authority of Mr. James B. Allan. The author proceeds with the results of his examination of the various kinds of gamboge, which were selected with great care by competent judges. We make the following extracts, by permission:

"1. *Pipe Gamboge* is so termed in the nomenclature of the drug-market, from its peculiar form. It occurs chiefly in cylindrical masses, from three-quarters of an inch to nearly three inches in diameter, commonly hollow, and often doubled upon themselves, and cohering. Not unfrequently several of these pipes or cylinders are firmly accreted into irregularly-shaped cakes or balls, two or three pounds in weight; in which, however, the remains of the cavities may be traced, though much flattened. The surface of the unaccreted cylinders is dirty greenish-yellow, and striated—evidently from the impression of the reed-moulds into which it is run when soft. Where several cylinders have been joined together, and squeezed into a cake or ball, the mass is usually wrapped in large leaves, which appear to belong to a malvaceous or bombaceous plant. Pipe gamboge is very brittle, and presents a somewhat conchoidal fracture, the surface of which is smooth, brownish-yellow in tint, and glimmering in lustre. It becomes bright gamboge-yellow wherever it is frayed or rubbed, and very readily forms an emulsion or paste of the same hue when rubbed with the wet finger. It has scarcely any taste; but after a short time produces a sensation of acridity, especially in the back of the throat. Neither has it any smell; yet the fine dust, raised in pulverizing it, quickly irritates the nostrils,

even in quantities inconceivably minute, exciting a profuse flow of mucus, and some sneezing, but without pain.

"This variety of gamboge is familiarly known to be an excellent and powerful purgative, which in the dose of three, five, and seldom more than seven, grains, produces profuse watery discharges; nor has there ever appeared to me any reason for dreading its effects, as our predecessors did; for its action is seldom or never accompanied with much pain or other uneasiness, if it is thoroughly pulverized with some other finely pulverizable substance, such as cream of tartar. Yet, on the other hand, it is a dangerous poison in large doses; one drachm has proved fatal; and the cause of death is violent inflammation of the bowels. I believe that the occasionally fatal effects of a nostrum much in vogue in the present day, under the name of Morison's Pills, have been satisfactorily traced to an over-dose of gamboge.

"It was this variety which Braconnot analyzed. As for the analysis of Professor John, which seems also to have been applied to the Pipe gamboge, it differs so entirely from what I have obtained from all the varieties I have yet examined, that some error must have been committed in his proceedings. In all probability the error arose from his employing rectified spirit for separating the principles from one another; because rectified spirit, in dissolving the resin, takes up also a considerable part of the gum. The same objection is applicable to the analysis of Braconnot, though he has obtained more nearly the true proportions of the principles.

"The best solvent for separating the resin of pipe gamboge is sulphuric ether. When agitated with the powder, a lively orange-red solution is obtained, which becomes gamboge yellow by dilution, and continues to show this tint when very greatly diluted, proving the exceeding intensity of the colour. On distilling off the greater part of the ether, and then driving away what remains by heating the residue in an open porcelain cup, a very beautiful, brittle resin is obtained, which has in thin layers a deep orange-colour and complete transparency, and in thicker masses a cherry-red tint, so dark as to produce

almost complete opacity, and which possesses, in fine powder a lively gamboge-yellow hue.* It is remarkable that the very volatile fluid, sulphuric ether, adheres with great force to this resin, insomuch as to be the source of much trouble, and even error, in a quantitive analysis. The vapour bath heat of 212° F. I found insufficient to drive off so much ether as to leave the resin firm when cold; even at the temperature of 270°, maintained by means of a muriate of lime bath for six hours, so large a quantity was retained, that the detached principles almost always weighed conjunctly three per cent. more than the crude subject of analysis; nay, a heat of 400°, subsequently applied for four hours by an oil bath, which I considered the highest temperature to be safely applied to the resin, and which sent off copious bubbles of ethereal vapour, still left a slight surplus of weight in the separated principles when summed up.

"The ether leaves, in the case of Pipe Gamboge, a flocculent matter, which, when thoroughly exhausted by the repeated action of the same fluid, coheres somewhat and acquires a very pale yellowish-white colour. In fine specimens of this gamboge, I have always found the flocculent residuum to be composed entirely of gum, presenting the leading characters of the prototype of the gummy principle named *Arabin*, from is forming almost the entire mass of gum Arabic. It is entirely and easible soluble in cold water, forming a pale yellowish solution, which, when concentrated, becomes viscous, and when dried, forms a transparent, reddish substance, of a mucilaginous taste with acridity. Braconnot thought the gum analogous to that of the plum tree; which, however, contains a considerable portion of the insoluble variety of gum named *Cerosin*, a variety entirely absent in Pipe Gamboge.

"The proportions of the two principles vary somewhat, as will appear from the following results of trials made with one

* Its colour is so intense that it communicates an appreciable yellowness to ten thousand times its weight of spirit.

hundred grains of two distinct specimens apparently of the same quality.

	First.	Second.
Resin heated at 400°, till it ceased to lose weight, ...	74.2	71.6
Arabin, or soluble gum, heated at 212°, till it ceased to lose weight, . .	21.8	24.0
Moisture discharged by a heat of 270°, .	4.8	4.8
Woody fibre, ...	trace	trace
Total . .	100.8	100.4

"In another analysis so much as 27.3 per cent. of gum was obtained. But as the resin was not carefully determined, and there was, therefore, no check on the analysis, the accurary of that result cannot be positively relied on.

"It follows that Pipe Gamboge consists of resin and gum, without any volatile oil, which is a very common ingredient of other gummy-resinous exudations. The large proportion of gum accounts well for its easy miscibility with water, by which, on the one hand, its suitableness for the purposes of the painter is judged of, and which, on the other hand, renders it in medical practice convertible into a smooth and perfect emulsion, without any of the additions usually resorted to for that end.

"I have nowhere met with any allusion to the question, in what principle the active properties of Pipe Gamboge reside. Since it consists of nothing else but gum and resin, the natural inference must be, that as gum is always bland and simply demulcent when pure, the acridity will be found to reside in the resin. This I have accordingly ascertained to be the case. The resin of gamboge, heated to 260° to drive away most of the ether, was administered as a purgative to several individuals alternately with gamboge itself; and both were found to occasion identically the same effects in kind—the resin, like the crude drug, occasioning profuse watery discharges, without pain or other uneasiness, in the dose of five

grains. But its operation was certainly different in degree, the effect being always less in the dose of five, or five and a half grains, than from the equivalent dose of seven grains of gamboge, although care was taken to administer both to the same individuals, and in identically the same circumstances, so far as this condition could be secured. I was at first inclined to imagine that the diminution of effect might be owing to a partial change produced by the heat to which the resin had been exposed. But this idea was necessarily abandoned on subsequent proof being obtained that a higher heat of 400°, which is little short of that required to produce chemical disorganization of the resin, has no further deteriorating influence.

"But it may be asked, whether the acridity of Gamboge is a property of the resin itself, or of some principle united with pure resin, and concentrating in itself the whole active qualities of the drug. On this point, chemical analysis has not yet thrown any light; nor have I been able to add anything to what is already known. Certainly no decomposing agent hitherto applied has detached a peculiar active principle from the resin; and it further appears probable that the process of saponification, which might be expected to detach an active principle, if it really were present, not only has no such effect, but even, according to some Pharmacologists, alters materially the action of Gamboge. For it is stated that Gamboge, converted into a soap by the action of an alkali, ceases to be purgative; so that a dose of twenty grains in this form has none of the usual effect, and, on the other hand, acquires diuretic properties. If these arguments, however, seem to favour the opinion that the active principle is nothing else than the resin itself, it should at the same time be remembered as favouring the opposite view—that the greater part of pure resins are nearly or entirely inert; and still more, that it has been proved in regard to the closely allied class of vegetable productions, the fixed oils, comprising several acrid species, such as croton oil, the oil of the physic nut, and some other energetic purgative oils, that their activity is not inhe-

rent in the simple oil, but resides in a peculiar volatile acid principle, which may be detached.

"2. Passing next to the *Lump* or *Cake Gamboge*, it must appear evident, that the composition of this variety will vary much according to its quality. At least from what has been said above of its commercial history, it must either vary much, or we must separate from this sort all the kinds often mixed with it, and vaguely known in trade by the name of *Coarse* Gamboge. The finer qualities of it usually called Cake or Lump Gamboge by druggists, appear from what I have seen, to be tolerably uniform. It is met with in amorphous masses, weighing two or three pounds, and upwards, if unbroken. It presents outwardly no striated marks of fibres. It contains visible fragments of wood, and sometimes twigs of considerable size. It is not dense, smooth in texture, and easily frangible, like the Pipe variety, but full of little air-cells, less easily broken, and also much more difficult to reduce into fine powder. Its fracture is not conchoidal, rather splintery, and quite free from any glimmering lustre. Its colour, however, is much the same with that of Pipe Gamboge; its taste and odour are the same; and it very readily forms, with the wet finger, a smooth, bright Gamboge-yellow emulsion. Possibly the finer sorts which approach Pipe Gamboge in price, may also more nearly resemble that variety in external characters than has been here laid down; but I have not met with any such specimens. True Pipe Gamboge, however, it must be remembered, is often met with in the form of cakes, owing to several pipes or cylinders having been firmly agglutinated while soft.*

"The chemical composition of Cake Gamboge is also materially different. It is not, like the Pipe variety, entirely dissolved by the successive action of the two solvents, sulphuric ether and cold water. About eleven per cent. of

* Cake Gamboge boiled in fine powder with water, forms an emulsion; which is rendered deep green by tincture of iodine; while an emulsion of Pipe Gamboge, similarly prepared, merely becomes somewhat tawny.

insoluble matter remains, which in cold water subsides commonly in two layers—the uppermost white, and very finely pulverulent; the lower one grayish, and rather flocculent. The former proved to be fecula, entirely soluble in boiling water, and then giving an abundant blue precipitate with tincture of iodine—the latter quite insoluble in boiling water with even six hours of ebullition, burning entirely away, with the flame and odour of burning wood, and with a mere trace of earthy residue, and therefore apparently woody fibre or lignin. The analysis of two samples gave results nearly concordant, as follows:—One hundred grains were used, and all visible fragments of wood were excluded.

	First.	Second.
Resin, dried in oil bath at 400°, . .	64.3	65.0
Arabin, dried at 260°, ...	20.7	19.7
Fecula, dried at 212°, ...	6.2	5.0
Lignin, dried at 212°, ...	4.4	6.2
Moisture, ...	4.0	4.2
	99.6	100.1

"The proportion between the gum and the resin is here identically the average proportion already mentioned as existing in Pipe Gamboge; so that, on simply abstracting the fecula and woody fibre, an article is constituted of precisely the same chemical composition. This circumstance, coupled with the presence of the particular principle fecula and the vesicular structure of the cakes, renders it extremely probable, if not certain, that Cake Gamboge is not simply a natural production, but rather a manufactured substance—an adulteration. For in the first place, it is the pure exudation *plus* so much impurity; secondly, fecula, is not known to be produced from the trunks, branches, or leaves of plants belonging to that part of the botanical system in which the true Gamboge tree undoubtedly will be found to be properly placed, and it is therefore almost impossible that its presence depends on

some mere variety in the period of collection or other circumstance in vegetation; and thirdly, the vesicular texture so different from the compact uniform texture of Pipe Gamboge, is exactly what might be expected from the process of wetting the exuded juice, beating it up with other pulverulent substances, and then drying it. It might be objected that eleven per cent. of foreign matter is a small addition for an adulteration. But this amount may, after all, be quite equivalent to the grower's profit from the pure article; and it will presently be seen, that a larger proportion of adulteration may so dilute the yellow tint of the mixture as to render it almost unmarketable.

"We cannot doubt that the resin of Cake Gamboge possesses the same effects on the body with that of the Pipe variety. So that this topic may be passed over.

"3. The *Coarse Gamboge* of some English druggists is classed by others with the Cake variety, and I apprehend correctly, since chemical analysis shows that it is nothing else than the lowest quality of that kind. I have received two specimens from an experienced London druggist, under the name of Coarse Gamboge, one of which represents very nearly the external characters and composition of what has been described above as Cake Gamboge, while the other, which is greatly harder, more earthy in its fracture, and grayish-yellow in tint, both in mass, in powder, and in emulsion, evidently owes these differences to nothing else but a larger proportion of the same, or at least a similar adulterating ingredient. The composition of these specimens was as follows for 100 grains:—

	First.	Second.
Resin, dried in the oil bath at 380°, .	61.4	35.0
Arabin, dried at 212°, . . .	17.2	14.2
Fecula, dried at 212°, ...	7.8	19.0
Lignin, dried at 212°, . . .	7.8	22.0
Moisture disengaged at 350°, . .	7.2	10.6
Total, .	101.4	100.8

With the ligneous fibre I have also included a trace of sandy particles and other impurities.

"4. *Ceylon Gamboge*, as I have seen it, is usually in small irregular fragments, but as originally collected is in flattish round masses, as if moulded into shallow bowls, weighing about a pound or upwards; and it appears to be composed of aggregated irregular tears, with interspaces and cavities, which are lined with a dark powdery matter, or with a powder of an earthy appearance. Altogether it seems a very coarse article. But on attentive examination it will be found, that the tears, of which by far the greater portion of it is composed present the compact texture, smooth fracture, and glimmering lustre of fine Pipe Gamboge; that its powder has an intense gamboge-yellow tint; and that a smooth emulsion is very readily formed by it, with the wet finger. Dr. Duncan, indeed, has stated that it has not the properties of true gamboge;* and I know he referred to its not being sufficiently emulsive to form a smooth mass with water for the use of the painter. But in this he is not quite correct. The specimen of concrete juice adhering to the bark, which was sent to him by Mr. Anderson Blair, is certainly not so emulsive as Siam Gamboge. But the ordinary Cingalese article, also sent by the same gentleman, is much more perfectly so. And the specimen sent by Mrs. Colonel Walker to Dr. Graham, as well as others subsequently sent to myself, comprising a splendid specimen of it adhering to the bark of the tree, seem to me to form with great ease an emulsion no wise inferior in smoothness, and very little, if at all in liveliness of tint, to that of the very best Pipe Gamboge of Siam. On this point I have taken the precaution of consulting an experienced professional colourist; and he reports that Mr. Anderson Blair's specimens present many fragments quite equal to the Pipe Gamboge as a pigment, but that it does not mix well with some other colours, such as Prussian blue, and shows a tendency to curdle with them—an objection, however, from

* Edinburgh New Dispensatory, Ed. 1820. Art. Gamboge.

which I have since been told the finest varieties of Gamboge are not quite exempt. To this testimony may be annexed that of Mrs. Walker herself, who is a skilful colourist, and who both states in her communication to Dr. Graham, that she finds Ceylon Gamboge quite equal to that of Siam, and has since added, in a very interesting letter to myself, that all the additions sometimes made to it by the Cingalese artists, such as lime-juice, the gum of the *Feronia elephantum*, or lime-powder, are not only unnecessary, but have likewise appeared to her even to injure its tint.

"The inference, that good Ceylon Gamboge may be easily put to use in the art of painting, is borne out by its chemical composition. As in the instance of Cake Gamboge, so here, sulphuric ether and cold water do not effect a complete solution, but leave about five per cent. of insoluble matter. This, however, does not contain any fecula; and it appears to be entirely composed of the fibre of the wood and bark introduced accidentally. It presents visible fibres; is insoluble in all simple solvents either hot or cold; burns almost entirely away with a good deal of flame and a smell of burning wood, and has a dark brownish-black colour. The ashes of this residuum, amounting to three per cent. of it, consists of carbonate of lime, with a trace of oxide of iron. The following results were obtained from three analyses of Mrs. Colonel Walker's specimens, evidently different in purity. The quantity used was 100 grains:—

	First.	Second.	Third.
Resin, heated at 400°, . . .	68.8	71.5	72.9
Arabin, dried at 240°, . . .	20.7	18.8	19.4
Fibre of wood and bark at 212°, .	6.8	5.7	4.3
Moisture, ...	4.6	not ascertained.	
Total	100.9	96.0	96.6

Moisture not reckoned.

Here it is evident that the proportion of gum and resin to one

another is as nearly as possible the same with their proportion in some specimens of fine Pipe Gamboge.

"Having arrived at this result, it appeared to me an object of interest to examine the late Dr. Duncan's specimen of concrete juice adhering to the bark, in order to ascertain whether it is generically the same article with the other specimens whose composition has been already mentioned, and whether its composition throws any light on the cause of the inferior miscibility with water which characterizes this, in common with some other varieties of Gamboge. I could spare only about four and one-third grains (4.329,) without injuring the specimen; but by proceeding carefully, the following results were obtained:—

	Grains.	Per cent.
Resin, heated at 400°, . . .	3.270	75.5
Arabin, dried at 212°, . . .	0.793	19.0
Insoluble residue, probably Cerasin, because soluble in boiling water, yet not then acted on by iodine, .	0.029	
Probable moisture, say as in Siam Gamboge, ...	0.208	4.8
Total	4.300	99.3

From this analysis it seems to follow, that the present specimen is generically a true Gamboge. It contains indeed between four and six per cent. less gum than Siam Gamboge, and between two and four per cent. less than the other specimens of Ceylon Gamboge which I have examined; but this difference can scarcely be held the less to constitute it a true Gamboge.* Since executing this analysis I have received through the great kindness of Mrs. Colonel Walker, another specimen similar to that of Dr. Duncan. Although I have

* On careful comparison, it appeared that the resin of Ceylon Gamboge produces, in solution, the identical tint and intensity of colour which have been already stated to characterize the resin of Siam Gamboge.

not submitted it to analysis, from unwillingness to spoil the specimen, I am satisfied, from the great ease with which it makes an emulsion with water, that this specimen must contain a full proportion of gum.

"From the whole of the previous account of the properties and composition of the different kinds of Gamboge, the following conclusions may, I think, be reasonably drawn.

"It has just been shown, that the composition of this concrete juice varies somewhat in the respective proportions of its two essential ingredients, as it is produced by the same plant growing in the same climate and country. It is plain, therefore, that a difference in the place of growth of the tree may occasion a similar difference, greater in degree; and consequently that Siam Gamboge may perfectly well be produced by the same species which is known to produce the Gamboge of Ceylon.

"It further appears, that the proportion of gum to the coloured resin may vary somewhat, without the emulsive quality of the article being materially altered; but that a very small diminution of the gum below a certain proportion will render the gum resin incapable of forming a smooth emulsion, which property is indispensable for its employment as a pigment.

"In the next place, there can be scarcely any doubt, that the Gamboge tree of Ceylon may be made to yield, with due care, a fine and perfect Gamboge, so far as concerns the art of painting. And the conditions for success probably are, 1. That the exudation be collected from the tree with more care than at present, so as to be kept free of woody fibre and the darker particles of bark, by which the purity and liveliness of the yellow tint are somewhat impaired. 2. That care be taken to ascertain in what circumstances of season, soil, cultivation, or the like, the exuded juice contains the due proportion of gum, that is, not less than 20.5 per cent. of the gum resin when perfectly dry. 3. That where the gum is rather deficient, it be supplied by express addition. Probably, indeed, the whole Gamboge of Ceylon may be improved by

the addition of three or four per cent. of gum; and, at all events, some kinds of it require such addition, as seems well known to the Cingalese, who, according to Mrs. Walker, when they use it as a pigment, sometimes add a little of the gum of the *Feronia elephantum*, or Wood-apple. In regard to the first of these conditions, it ought to be known, that, according to the only account hitherto obtained of the mode of collecting Gamboge in Siam, namely, the information communicated to Koenig by a Portuguese Priest, who said he had witnessed the process, this variety of the drug is actually prepared, not from the bark, but from the leaves, by bending down the branches, cutting the leaves across, and collecting the droppings. Koenig's account certainly does not seem very probable; yet it ought to be kept in view, and subjected to trial in Ceylon. The Cingalese method is to obtain it from the bark, sometimes by making incisions through it, and sometimes by shaving off portions of the outer bark as large as a man's palm. It seems scarcely necessary for me to point out how readily this crude method will lead to the introduction of woody fibre into the article, or how easily the method may be improved so as to exclude such impurity.

"As to the use of Gamboge in medicine, I am satisfied that the Ceylon variety possesses the properties of the finest Siam Gamboge in full perfection. Mrs. Walker says, that in the Island of Ceylon it is used by the native doctors precisely for the same purposes with Siam Gamboge in Europe and elsewhere. I have made many experiments in my Clinical Wards in the Royal Infirmary, with the article sent by Mr. Anderson Blair, and invariably found it at least as effectual as the common drug used in this country. From comparative trials, indeed, made in the same individuals, I am even of opinion, that Ceylon Gamboge is the more powerful of the two, while it is equally safe and free from any accessory unpleasant operation.

"In conclusion, then, I may venture to express my firm persuasion, that Europe need not be indebted to Siam alone for its Gamboge; and that, with a little enterprise and due atten-

tion on the part of our Government and settlers in Ceylon, Gamboge of the most esteemed quality may be added to the other European exports of that prolific and highly favoured island."

The *Garcinia cambogia*, *Xanthochymus pictorius*, and *Garcinia pictoria* afford resins which resemble gamboge, but which possess none of its active properties, according to the experiments of Dr. Christison.

British Annals of Medicine.

ART. XXIV.—OBSERVATIONS ON SULPHUROUS ETHER, AND SULPHATE OF ETHERINE (THE TRUE SULPHUROUS ETHER.) By R. Hare, M. D., Professor of Chemistry in the University of Pennsylvania.*

It is known that when two parts, by weight, of sulphuric acid are distilled with one of alcohol, a yellow sulphurous liquid is obtained. Berzelius alleges, that when this liquid is exposed in an exhausted receiver over sulphuric acid and hydrate of potash, an oleaginous liquid remains, which he designates as "*oil of wine containing sulphuric acid, or heavy oil of wine.*"

This oil is, by the same author, described as being heavier than water, as having a penetrating aromatic odour, and a cool pungent taste, resembling that of peppermint. It is, in fact, the liquid which Hennel first analyzed as oil of wine, without, at the same time, mentioning the process by which it was procured. No doubt the difference between it and that procured by Boullay and Dumas, was, in some degree, the cause of the discordance between his observation and theirs. Ac-

* From the American Philosophical Transactions.

cording to Hennel, the oil of wine consists of an atom of sulphuric acid, and an atom of hydrocarbon: $\ddot{S}+4C+4H$. By the last mentioned appellation, this skilful chemist designates a compound consisting of four atoms of carbon, and four of hydrogen.

Serullas represents the oil in question as consisting of two atoms of the acid, two of hydrocarbon or etherine, and one of water.

To the hydrocarbon of Hennel ($4CH_2$) as the common base of all the ethers, excepting those lately alleged to have mytheline for a base, the name of etherine has been given; so that the heavy oil of wine may be called the sulphate of etherine: or, according to the formula of Serullas, $2\ddot{S}E+\dot{H}$, it is a hydrous sulphate of etherine. It is, in fact, the only compound to which the name of sulphuric ether can be applied with propriety. The yellow liquid from which it is procured, as above stated, may be designated as the ethereal sulphurous sulphate of etherine.

Another oil, lighter than water, resulting from the distillation of the ethereal sulphurous sulphate of etherine, from hydrate of lime, or from potash, is described by Berzelius as oil of wine exempt from sulphuric acid. Of this the odour is represented as disagreeable; and, though nothing is said of its taste, it is to be presumed that it differs from the heavy oil of wine in this respect, as well as in its odour and specific gravity.

Thenard alleges, that when the heavy oil of wine is heated with water for some time, a liquid swims on the water, which, if refrigerated by ice, will, within twenty-four hours, deposit crystals. The mother liquid he calls light oil of wine, while to the crystals he gives the name of concrete oil of wine. Hennel mentions his having obtained a similar product by the reaction of oil of wine with water, or an aqueous solution of potash; and treats the crystalline matter as the base of the heavy oil of wine, deprived of its acid; or, in other words, as his "hydrocarbon;" or, as above mentioned, etherine.

Considering how much has been written on this topic, I

am surprised that I have met with no statements respecting the reaction of ammonia with the above mentioned ethereal sulphurous sulphate of etherine.

Since the year 1818, I have been accustomed to saturate the acid in that liquid by ammonia. The residue being rendered very fragrant, and entirely freed from its sulphurous odour, by admixture with about twenty-four parts of alcohol, was found to constitute an anodyne, possessing eminently all the efficacy of that so long distinguished by the name of Hoffman. When the residue, remaining after saturation with ammonia, was distilled in a water bath, ether came over, and left an oil which I was accustomed to consider as the oil of wine.

I had observed that, in the process above mentioned, there was a striking evolution of vapour, which seemed irreconcilable with the received opinion of the re-agents employed. Since the affinity between the ammonia and sulphurous acid is energetic, it did not appear to be reasonable that a copious escape of the one should be caused by its admixture with the other; and it was no less improbable that the vaporization of hydric ether, in its natural state, could take place at temperatures so much below its boiling point as those at which this phenomenon was noticed. In order to ascertain the truth, I luted a funnel, furnished with a glass cock and an air tight stopple, into the tubulure of a retort, of which the beak was so recurved downwards as to enter and be luted into the tubulure of another retort. The beak of the latter passed under a bell over water.

Both retorts were about half full of liquid ammonia, and surrounded with ice. The apparatus being thus arranged, about a thousand grains of the ethereal sulphurous sulphate of etherine were poured into the funnel, and thence gradually allowed to descend into the ammonia in the first retort. Notwithstanding the refrigeration, much heat was perceptible, and a copious evolution of vapour, which, passing into the second retort, was there absorbed or condensed, none being observed to heat the bell glass. At the close of the operation,

hydric ether, holding oil of wine in solution, floated upon the ammonia in the first retort, and pure ether, of the same kind, floated on the ammonia in the second.

The ammonia in both retorts gave indications of the presence of sulphurous acid, on the addition of sulphuric acid. From these results, I inferred that a chemical compound of sulphurous acid and hydric ether formed the principal portion of the yellow liquid, and might be separated by distillation. Accordingly by means of retorts arranged and refrigerated as above described, I procured a portion of sulphurous ether, which boiled at 44°, and which, when agitated with ammonia in a bottle, produced so much heat and consequent vapour, as to expel the whole contents in opposition to the pressure of my thumb. By employing the same distillatory apparatus, I subjected 2150 grains of the ethereal sulphurous sulphate of etherine to distillation, and obtained 726 grains of sulphurous ether, which boiled as soon as the frigorific mixture was removed from the containing retort. This being redistilled, as in a former experiment, so as to receive the product in ammonia, left in the retort five grains of oil of wine. The resulting ammoniacal liquid, saturated with chloride of barium in solution, gave a precipitate which, agreeably to the table of equivalents, contained 356 grains of sulphurous acid.

The residue of the 2150 grains of ethereal sulphate being subjected to distillation, raising the temperature from 95°, the point at which it had been before discontinued, to 140°, the product obtained by means of a refrigerated receiver weighed 602 grains. This was of course, inferior in volatility to the first portion distilled; and, when redistilled, it was found to contain a small quantity of oil of wine. In fact, it appears, the boiling point of the ethereal sulphurous sulphate rises, not only as the ratio of the sulphurous acid lessens, but also as the proportion of oil of wine augments.

The residual liquid being exposed to the heat of a water bath at 212°, a very fragrant, and well flavoured oil of wine was evolved, and floated upon a quantity of water acidulated by sulphuric or sulphovinic acid.

Agreeably to another experiment, 1750 grains by weight, of the ethereal sulphurous sulphate of etherine, after washing with ammonia, gave 869 grains of an ethereal solution of oil of wine. This being subjected to distillation by a water bath raised gradually to 190°, there remained in the retort 148 grains of oil, beneath which there were a few drops of acidulated water. Agreeably to the result of several experiments, the ethereal sulphurous sulphate of etherine yields about half its weight of the ethereal solution of oil of wine. The quantity is always somewhat less than half when weighed; but the deviation is not greater than might be expected to result from the loss by evaporation, and the diversity of refrigeration employed in the condensation of the ethereal sulphurous sulphate, during the process by which it is evolved.

Under the expectation of procuring a sulphurous ether of a still higher degree of volatility, I associated with the apparatus usually employed in the process for generating hydric ether, a series of tubulated retorts, of which the beaks were recurved downwards in such a manner that the beak of the first communicated with a perpendicular tube, passing through an open-necked cylindrical receiver, so as to enter the tubulure of the second retort, of which the beak was in like manner inserted into a tube passing through a receiver in a third retort, and this communicated in like manner with a fourth retort. The second, third and fourth retorts, and the tubes entering them, were all refrigerated, the first with ice, the second with ice and salt, and the third with ice and chloride of calcium.

By these means, on subjecting to distillation in the first retort 48 ounces of alcohol of 830, and a like weight of sulphuric acid, besides the ethereal sulphurous sulphate of etherine usually resulting from the process, and condensing in the first receiver, it was found that in the other retorts severally, there were liquids of various degrees of volatility. That in the last boiled at 28°, but the boiling points rose gradually as the quantity of the residual liquid diminished.

In order to ascertain the nature of the sulph-acids abstracted

from the ethereal sulphurous sulphate of etherine by the ammonia employed, chloride of barium was added in excess to the resulting ammoniacal solution, until no further precipitate would ensue. The liquid having been rendered quite clear by filtration, soon became milky. By evaporation to dryness, and exposure to a red heat, a residuum was obtained which proved partially insoluble chlorohydric acid, and by ignition with charcoal, yielded sulphide of barium. It appears, therefore, that a hyposulphate of barytes existed in the liquid after it was filtered; as I believe that the hyposulphuric acid is the only oxacid of sulphur which is capable of forming with barytes a *soluble* compound, susceptible, by access of oxygen, of being converted into an insoluble sulphate, and precipitating in consequence.

It must be evident from the facts which I have narrated, that the yellow liquid obtained by distilling equal measures of sulphuric acid and alcohol, consists of oil of wine held in solution by sulphurous ether, composed of nearly equal volumes or weights of its ingredients; also, that the affinity between the *ether* and the acid is analogous to that which exists between alcohol and water. The apparent detection of sulphuric acid in the ammonia, justifies a surmise, that the etherine distils in the state of a hyposulphate, which subsequently undergoes a decomposition into sulphurous acid and sulphate of etherine.

The liquid above alluded to, as resulting from the saturation of the ethereal sulphurous sulphate of etherine by ammonia, and distillation by means of a water bath gradually raised to a boiling heat, is a very fragrant variety of oil of wine. It differs from that described by Berzelius as the heavy oil of wine of Hennel and Serullas, in being lighter and containing less sulphuric acid. I have a specimen exactly of the specific gravity of water, and have had one so light as to float on that liquid. The oil of wine obtained by ammonia approximates, in its qualities, to the variety which Thenard describes as light oil of wine. The presence of sulphuric acid in a definite

or invariable ratio does not appear requisite to the distinctive flavour or odour of oil of wine.

The heavy oil of wine, treated by Hennel as sulphate of hydrocarbon, $2\ddot{S}+4CH$, and by Serullas as a hydrous sulphate of etherine, $4CH+2\ddot{S}+\dot{H}$, I have obtained as above mentioned, by exposing the ethereal sulphurous sulphate of etherine, in vacuo, over the hydrate of lime, or potash, and sulphuric acid. This variety sinks in water, being of the specific gravity of 1.09 nearly; is of a deeper hue than the other, and of a smell less active, with a taste somewhat more rank. A specimen of oil thus obtained being subjected to the distillatory process, a portion came over undecomposed, leaving in the retort a carbonaceous mass. 14 grains of the oil which had not undergone distillation, and a like portion of the distilled oil, were severally boiled in glass tubes with nitric acid until red fumes ceased to appear; about 28 grains of pure nitre were added to each, some time before the boiling was discontinued. The resulting liquid was in each case poured into a platina dish, boiled dry, and afterwards deflagrated by a red heat. The residual mass being subjected to water, the resulting solution was filtered, an excess of nitric acid added, and then nitrate of barytes in excess.

The precipitate obtained from the distilled oil, weighed, when dry, only nine and five-eighths grains while that procured from the oil which had not been distilled, amounted, under like circumstances, to fourteen and one-eighth grains. Ten grains of another portion, left for some time over liquid ammonia, yielded only seven-eighths of a grain of sulphate.

About a drachm of Hennel's oil of wine was subjected to distillation with strong liquid ammonia; fourteen and a half grains came over, retaining the appropriate fragrance and flavour. This yielded, by the process above described, only two grains of sulphate of barytes. After all the water and ammonia had distilled, the receiver was changed, and fourteen grains of oil, devoid of the fragrance and flavour of the oil of wine, were obtained. This yielded one and one-eighth grains of

sulphate. A carbonaceous mass, replete with sulphuric acid, remained in the retort.

Hennel states that when oil of wine was heated in a solution of potash, an oil was liberated which floated upon water, having but little fluidity when cold; and which, in some cases, partially crystallized. When gently heated, it became clear, and of an amber colour. The vapour had an agreeable, pungent, aromatic smell. This oil must have been pure etherine.

It is not improbable that this oil, which may be considered as devoid of sulphuric acid, is more or less liberated in evolving oil of wine, according to the nature of the process employed; and that the oil alluded to by Thenard, and those procured by me by simple distillation, ebullition, or distillation with ammonia or potassium, are mixtures of the etherine with its sulphate in various proportions. As it is well known that the odour of the essential oils is rendered more active by dilution, the livelier smell of the solutions may be consistent with a diminished proportion of the odoriferous matter.

Oil of wine cannot be distilled per se without partial decomposition, which does not take place below the temperature of 300. When subjected to the distillatory process, over potassium, at a certain temperature, a brisk reaction ensued, and the oil and metal agglutinated into a gelatinous mass. By raising the temperature the mass liquefied, and a colourless oil came over, which retained the odour of oil of wine. Meanwhile some of the potassium remained unchanged, and appeared within the liquid in the form of pure metallic globules. On pouring into the retort a portion of nitric acid in order to remove the caput mortuum, ignition took place from the presence of the potassium.

ART. XXV.—OF THE REACTION OF THE ESSENTIAL OILS WITH SULPHUROUS ACID, AS EVOLVED IN UNION WITH ETHER IN THE PROCESS OF ETHERIFICATION, OR OTHERWISE. By R. Hare, M. D., &c., &c., &c.*

Having mixed and subjected to distillation two ounces of oil of turpentine, four ounces of alcohol, and eight ounces of sulphuric acid, a yellow liquid came over, having all the appearance of that which is obtained in the process for making oil of wine, described in the preceding article. On removing, by means of ammonia, the sulphurous acid existing in the liquid, and driving off the ether by heat, a liquid remained, which differed from oil of turpentine in taste and smell, although a resemblance might still be traced. This liquid was without any sensible action on potassium, which continued bright in it for many weeks. It proved, on examination, to contain a small quantity of sulphuric acid. I ascertained, afterwards, that in order to produce these results, it was sufficient to pour oil of turpentine on the mass which remains after the termination of the ordinary operation for obtaining ether, and apply heat. Subsequently it was observed that when the sulphurous ether was removed by heat or evaporation, without the use of the ammonia, the proportion of sulphuric acid in the remaining oil was much greater.

By subjecting to the same process several essential oils, I succeeded in obtaining as many liquids to which the above remarks were equally applicable. With some of the oils, however, similar results were, by this method, either totally or partially unattainable, in consequence of their reaction with the sulphuric acid being so energetic as to cause their decomposition before any distillation could take place. No product can be obtained by distillation with sulphuric acid and alcohol from the oil of cinnamon obtained from cassia. From the oils of sassafras and cloves, but little can be procured.

However, in one instance, by previously mixing the oil of

* From the American Philosophical Transactions.

sassafras with the alcohol, in the manner described in the account given of the first experiment with the oil of turpentine, I succeeded in obtaining in addition to a small quantity of the heavy liquid containing sulphuric acid, a minute quantity of a lighter one, devoid of that acid, which burned without smoke, was insoluble in water and very fluid. I am disposed to consider the liquid thus procured as a hydrate of sassafras oil, or sassafreine, as I would call it, being analogous to hydric ether.

The oil of sassafras, whether isolated or in combination, possesses a remarkable property, which, I believe, has not attracted sufficient observation: I mean that of producing an intense crimson colour, when added, even in a very minute quantity, to concentrated sulphuric acid.

One drop of oil of sassafras imparted a striking colour to forty-eight ounce measures of sulphuric acid, and appeared perceptible when it formed less than a five millionth part. This property was completely retained by the lighter liquid above described as procured from oil of sassafras.

I subsequently observed, that when sulphurous acid, whether in the form of sulphurous ether, in that of a gas, or when in union with water, was brought into contact with any of the essential oils, (including kreosote,) which were subjected to the experiment, they acquired a yellow colour, and a strong smell of this acid.

In the case of the yellow compound thus obtained from any of the essential oils which I have tried, if the sulphurous acid be removed by heat, the oil, by analysis, will be found to yield sulphuric acid. That some acid of sulphur remains in union must be evident, since washing with ammonia will not entirely remove the power of yielding sulphuric acid; and the total absence of the sulphurous smell demonstrates that the sulphurous acid either enters into an intimate combination with the oil, or acquires oxygen sufficient to convert it into sulphuric or hyposulphuric acid.

Those essential oils which contain oxygen, are most affected by the action of sulphurous acid.

Both the oils of cloves and cinnamon, after admixture with sulphurous ether and subsequent distillation, gave, on analysis, precipitates of sulphate of barytes. In the case of cloves, the precipitate amounted to one-seventh of the whole weight.

By distilling camphor with alcohol and sulphuric acid, I obtained a yellow liquid, which, by washing with ammonia and evaporation, in order to get rid of the sulphurous ether, yielded an oil. The oil, by standing, separated into two portions, one solid, the other liquid. The solid portion resembled camphor somewhat, in smell, but differed from it by melting at a much lower temperature, becoming completely fluid at 175°.

I found that the essential oils of cinnamon and cloves possessed an antiseptic power, quite equal to that of kreosote, and that their aqueous solutions, when sulphated, were even superior to similar solutions of that agent.

One part of milk mingled with four parts of a saturated aqueous solution of the sulphated oil of cloves, remained after five days sweet and liquid, while another portion of the same milk became curdled and sour within twenty-four hours. Having on the 2d day of July added two drops of oil of cinnamon to an ounce measure of fresh milk, it remained liquid on the 11th; and, though it finally coagulated, it continued free from bad taste or smell till September, although other portions of the same milk had become putrid. A half ounce of milk, to which a drop of sulphurous oil of turpentine had been added, remained free from coagulation at the end of two days, while another portion, containing five drops of pure oil of turpentine, became curdled and sour on the next day.

A number of pieces of meat were exposed in small wine glasses, with water impregnated with solutions of the various essential oils. Their antiseptic power seemed to be in the ratio of their acridity. The milder oils seemed to have comparatively little antiseptic power, unless associated with the sulphurous acid, which has long been known as an antiseptic.

In cutaneous diseases, and, perhaps, in the case of some

ulcers, the employment of the sulphurous sulphated oils may be advantageous.

A respectable physician was of opinion that the sulphurous sulphate of turpentine had a beneficial influence in the case of an obstinate tetter.

Possibly the presence of sulphurous acid may increase the power of the oil of turpentine as an anthelmintic.

Pieces of corned meet hung up, after being bathed with an alcoholic solution of the sulphurous sulphated oil of turpentine, or with solutions of the sulphated oils of cloves or cinnamon, remained free from putridity at the end of several months. That imbued with cinnamon had a slight odour and taste of the oil.

I am led, therefore, to the impression that the antiseptic power is not peculiar to kreosote, but belongs to other acrid oils and principles, and especially to the oils of cinnamon and cloves.

The union of sulphuric acid with these oils appears to render them more soluble in water: whether any important change is effected in their medical qualities by the presence of the acid, may be a question worthy of attention.

I have stated my reasons for considering the ammoniacal liquid, resulting from the ablution of the ethereal sulphurous sulphate of etherine with ammonia, as partially composed of hyposulphuric acid. By adding to this ammoniacal liquid a quantity of sulphuric acid, sufficient to produce a strong odour of sulphurous acid, and then a portion of any of the essential oils; a combination ensued, as already described, between the oils and the sulphurous acid liberated by the sulphuric acid, so as to render them yellow and suffocating. The habitudes of cinnamon oil from cassia under these circumstances were peculiar. A quantity of it was dissolved, communicating to the liquid a reddish hue. The solution being evaporated, a gummy translucent reddish mass was obtained, which, by solution in alcohol, precipitated a quantity of salt, and being boiled nearly to dryness, re-dissolved in water, and again evaporated, was resolved into a mass having the friability, con-

sistency, and translucency of common rosin; but with a higher and more lively reddish colour. Its odour recalls, but faintly, that of cinnamon; its taste is bitter and disagreeable, yet recalling that of the oil from which it is derived. Its aqueous solution does not redden litmus; nor, when acidulated with nitric acid, does it yield a precipitate with nitrate of barytes.

Of this substance ten grains were exposed to the process above mentioned, for the detection of sulphuric acid, and were found to yield a precipitate of 6.5 grains of sulphate of barytes.

It may be worth while to mention, that in boiling the sulphated oils with nitric acid, compounds are formed finally, which resist the further action of the acid, and are only to be decomposed by the assistance of a nitrate and deflagration. I conjecture that these compounds will be found to merit classification as ethers formed by an oxacid of nitrogen.

One of my pupils, in examining one of the compounds thus generated, was, as he conceived, seriously affected by it, suffering next day as from an over dose of opium. He also conceived that a cat, to which a small quantity was given, was affected in like manner.

I had prepared an apparatus with the view of analyzing accurately the various compounds above described or alluded to, by burning them in oxygen gas; when, by an enduring illness of my assistant, and subsequently my own indisposition, I was prevented from executing my intentions.

ART. XXVI.—REVIEW OF THE "REPORT FROM THE SELECT COMMITTEE ON MEDICAL EDUCATION, WITH THE MINUTES OF EVIDENCE AND APPENDIX." Part III.

Society of Apothecaries, London. Ordered by the House of Commons to be Printed, 13th August, 1834.

Continued from page 74.

In what manner are individuals selected for prosecuting, and how are these prosecutions conducted? To convey to our readers a proper view of the harshness with which this power of prosecution has been exercised, and that, too, in direct opposition to the spirit, both of the Charter and Act, we cannot do better than quote the following passages from the evidence before us; the more that it affords an ample proof of the truth of the charges of inconsistency and incompetency which we made against the heads of the Society, at the commencement of the present article. Our first extract shall be from the evidence of John Nussey, Esq.

"What is the principle that has guided your Society in selecting objects for prosecution, as violaters of the provisions of the Act of 1815? The mode in which that is conducted is also by a committee. Who is the chairman of that committee. The master for the time being? Yes. What then is the principle which has guided that committee in its selection of individuals for prosecution? No fixed principle. Informations are sent to the clerk of the Society, who lays them before the committee. On their next meeting, the cases are taken into consideration by the committee, and instructions are given to the clerk to proceed, or not to proceed, as the case may happen. Has the Society been merely passive in receiving such informations, or has it been active in promoting inquiries as to who are violating the Act in different parts of the country? The Apothecaries' Society have had no occasion to be over active in making inquiries; for there have been abundant informations laid before them, more, in point of fact, than they have had the means of prosecuting. We

pay an individual and a clerk an annual sum for looking after such cases in London and its neighbourhood. Does the number of persons who practice as apothecaries in violation of the Act, much exceed the number that you have prosecuted? That is most likely, I think. Has your Society ever endeavoured to ascertain, by causing local inquiry to be made in every part of England and Wales, who the persons are that are actually in practice, which of them practise as apothecaries, and how many do so with, and how many without, the requisite qualification? No. I do not know that the Society have employed any person particularly for that purpose. I believe that during the trials that have taken place in various parts of the country, our clerk has been furnished, when he has attended those trials with information respecting individuals in that neighbourhood, and I may state, that since this committee began to sit, the medical public have been much more in the *qui vive* with regard to unqualified individuals than before; for we have received, in the last three months, more informations on this subject, than at any previous time. Do you recollect what is stated in the preamble to the statute of 1813, to be the object of the statute? "And whereas much inconvenience has arisen from great numbers of persons of many parts of England and Wales exercising the functions of an apothecary, who are wholly ignorant and utterly incompetent to the exercise of such functions, whereby the health and lives of the community are greatly endangered, and it is become necessary that provision should be made for remedying such evils." The object of the statute being to prevent those persons from exercising the functions of an apothecary, who are wholly *ignorant* and *utterly incompetent* to the exercise of such functions, are the individuals whom the Society has selected for prosecution those particular individuals, who, out of the many violaters of the statute, appeared upon inquiry to be the most ignorant? I should say so, for the most flagrant cases have been always the first selected for prosecution. Yet if the choice of the persons to be prosecuted by the Society depends, as you say that it generally does, not upon its own impartial inquiries, but upon the informations

which other parties, oftentimes interested parties, choose to lay before it, is not this the result, that prosecutions fall upon the heads, not so much of the most incompetent as of the most successful unqualified practitioners? I think that such men have seldom or never been selected for prosecution, and the returns made to this committee, as to the number of the penalties recovered, would establish that point. I believe that the Society have received but £130 in penalties, from the first passing of the act of Parliament; therefore they could not be men of very considerable eminence, or of very great reputation who were prosecuted."

An extract is then produced of a letter from a country practitioner, who after having received a respectable medical education for the time, but not, as far as appears from the document, having undergone any examination, was, after being nine years settled in practice, prosecuted and convicted and subjected to a penalty of £20 and costs, the latter being £400. To enable him to dispense with impunity he took a qualified partner, but notwithstanding this, he was at the date of writing, threatened with another action. The examination then proceeds as follows:—

"If the statement in this letter is to be believed, it would appear that this gentleman underwent a very respectable course of medical education, and that the Society, therefore, does not confine its prosecutions to the most ignorant and incompetent of the persons exercising the functions of an apothecary without a qualification? That may be true, but we have no means of knowing, in the first instance, what the qualifications are, of such individuals. Informations are sent up to us by other professional gentlemen in the neighbourhood, who represent the hardship of a man, of perhaps an active and intelligent mind in other respects, running away with the business that formerly belonged to them; and therefore calling upon the society to protect them under those circumstances. The Society have no alternative, but of proceeding at once against a man, where the clearest evidence exists of his being an irregular practitioner. But considering that the object of the Act is to protect the public against the *wholly*

ignorant, and how great the powers are which the Act confers upon the Society, was not great discretion in the exercise of those powers required, so as to direct them solely against those utterly incompetent persons, from whom danger to the public was to be apprehended? I do not mean to dispute what this gentleman has stated with regard to his education. But a man, no matter what his education may have been, for the sake of getting a livelihood will often descend to such base means, as to render him obnoxious to his professional brethren in the neighbourhood, and in that view men are very frequently pointed out to us. For example, in a recent instance, an individual takes a parish, for that is a great ground of competition; the parishes are put up to the lowest bidder; and I have been told, since I came into this room, that an individual, so circumstanced, has taken a parish for six pounds a year, including all the operations of surgery and medical attendance that may be required, and it is wholly impossible that such attendance can be what it ought to be, at a price so absurdly low as that mentioned. By taking a parish, you mean giving medical attendance, advice and assistance and medicine to the poor of that parish? Yes, and performing all the surgical operations. A man who will degrade himself so far as to undertake duties of that kind, at so insignificant a price, and not being a qualified man, is surely a fair object for the companies' notice. The preamble to the statute does not appear to consider the takers of low parish contracts, but the wholly ignorant, as the persons who ought to be guarded against. Do you not consider, therefore, that it is the latter rather than the first, who are the fit objects for prosecution? I do certainly, and I venture to say that every discretion has been exercised with regard to that. Do you mean to say, that in every case of information against an unqualified person for practising as an apothecary, before a prosecution is decided on, inquiry is made by your Society, what has been his medical education; and that if he appears to be a man of respectable medical attainments, your society in that case forbears to prosecute? That has been our rule to a certain extent. Informations in the country, you say, are principally given by

one practitioner against another. When rivalry must often be the motive that leads to such information, is it not the man who has most success in practice, that is most subject to be informed against? Whenever an information is brought before the committee of our Society, our clerk is directed to write to some agent, living in the neighbourhood of the individual informed against; this agent is directed to collect information concerning the qualifications of the party accused, and evidence in the event of his being prosecuted; and it is upon the report of such agents, that we determine whether we shall proceed or not. Your inquiry seems to be directed to ascertaining rather the truth of the information, than the medical attainments of the individual informed against? I think sometimes it may be so. Do you, or do you not seek for evidence of this character, before you determine whether to prosecute or not; namely, whether the education of the party informed against, has been of a character to render him competent to the exercise of the functions as an apothecary, without endangering the health and lives of the community? We take no other means of making this inquiry, than the one already mentioned, by applying, through our clerk, to some agent in the neighbourhood of the residence of this individual. Is not information respecting the medical education of the party likely to come with most accuracy from himself; and upon his supplying such information, would it not be easy for you, by inquiry to ascertain whether the information was correct, and if it be proved to be correct, then to take it into consideration, whether his education was such as to render him fit to practice as an apothecary; and if so to forbear prosecuting him. Would not such a course be most consonant to the preamble of the Act which describes entire ignorance, and utter incompetency, as the evils intended to be provided against? Yes, admitting that the power with which the Society is invested was discretionary, it would certainly be their duty to look to these points; but as it is not so, I think they have no alternative, upon proper information and evidence of the illegality of such practitioners, but to proceed against them for the sake of those who are already qualified."

Mr. Nussey is then requested to point out the words of the statute which render it imperative upon the society to prosecute upon information being given them, and after some preliminary parrying, at last fixes upon the 14th clause. Now we have this clause before us at this moment, and we defy any human being, however ingenious, to construe it in such a manner, as to render it *imperative* on the Society to prosecute when information is given them against any individual. We give it *verbatim.*

"And to prevent any person or persons from practising as an apothecary, without being properly qualified as such, be it further enacted, that from and after the first day of August, 1815, it shall not be lawful for any person or persons (except persons already in practice as such) to practice as an apothecary in any part of England or Wales, unless he or they shall have been examined by the said court of examiners, or the major part of them, and have received a certificate of his or their being duly qualified to practise as such, from the said court of examiners, or the major part of them as aforesaid, who are hereby authorized, and required to examine all person or persons applying to them, for the purpose of ascertaining the skill and abilities of such person or persons in the science and practice of medicine, and his or their qualification to practise as an apothecary as aforesaid:—provided always, that no person shall be admitted to such examination until he shall have attained the full age of 22 years."

And this is the clause which renders it imperative on the Society to prosecute an individual who may have had his qualifications, both in medicine and surgery, tested by men, whose names carry authority with them wherever medical science is known, who may be willing to submit to another examination conducted by his inferiors in knowledge, but who, because he has not served in a menial capacity for five years, is deemed to have an education so radically defective, that nothing but beginning his studies over again can compensate for the evil. Mr. Nussey's free interpretation of the above paragraph is at variance with that of other office bearers of the Society who admit that there is no clause compelling the Apo-

thecaries' Company to prosecute. From the extract from Mr. Nussey's evidence which we have given above, we are forced to conclude, that the Society acts upon no fixed principles in instituting prosecutions; that it encourages medical men to be spies and informers against each other; that private spleen is the motive which prompts all prosecutions, affording a curious illustration of the standing and acquirements of the general practitioners alluded to above by the master, and that successful practice infallibly brings down the vengeance of the Society upon the head of the unexamined or unapprenticed offender. It would occupy too much time to point out all the inconsistencies and contradictions in that portion of Mr. Nussey's evidence given above. Every one who will take the trouble to peruse it attentively will have no difficulty in detecting them.

The following passage discloses at least one fixed principle in which the Society acts in regard to prosecutions, and that is, to intimidate all it can, and when the offender is too strong, to let him alone. Mr. John Bacot had previously stated that the Society were not bound to prosecute and that they exercised considerable discretion in instituting prosecutions. The examination then proceeds.

"The committee have before them a letter dated Apothecaries' Hall, April 24, 1832, signed by your late brother, Edmund Bacot, clerk and solicitor to the Society, addressed to a person who was a graduate in physic in one of the Scotch universities, and was practising in the north of England. The letter contains the following passage: 'You are not infringing on the rights of the Society of Apothecaries, but are acting contrary to the provisions of an Act of Parliament passed for regulating the practice of apothecaries in England and Wales, of which Act the Society, on any complaint, is bound and compellable to enforce the observance.' From this letter, and others to the same effect, it appears that your Society was in the habit of representing to the parties who were informed against for acting contrary to the provisions of the act of 1815, that the Society had no discretion, but was compelled to prosecute? I know that it was my brother's opinion that the

Society might be compelled to prosecute, when urged to do so by persons laying an information. Upon what that opinion was founded, not being myself a member of the legal profession, I cannot say. If it be so that they have no discretion, they have no more right to exercise forbearance in one class of cases, when the Act has been contravened, than in another? Certainly not, but then discretion is limited by their power, and unfortunately, they cannot prosecute every body. But it appears that in the case of Army and Navy surgeons, they have exercised a discretion in not prosecuting although they were aware that it was an infringement of an Act of Parliament. At the time when they determined to exercise that forbearance, I was not a member of the Court of Examiners; but I have a distinct recollection, from looking at the minute-book, that such suspension of the law was in consequence of a correspondence that took place between the Army and Navy medical boards, the Government and the Society of Apothecaries. A letter from the secretary of war, and from the Army and Navy medical boards requesting the Society to suspend the law in favour of Army and Navy surgeons, followed by compliance on the part of your Society, shows plainly that you did consider yourselves at liberty to forbear prosecuting, if you thought proper, and not as wholly without the power of exercising any discretion? That is true, provided they believed contrary to the opinion that was given that those who were appointed surgeons of the army and navy prior to 1st August, 1815, were not practising as apothecaries prior to August, 1815. If they who were appointed Army or Navy surgeons prior to August, 1815, were properly considered as apothecaries in practice, prior to that date, those who have been appointed since 1st August, 1815, must be considered as apothecaries in practice, subsequently to that date, and in their favour the law has been suspended? Legally speaking, that may be the case; but we know very well that they, every one of them, have undergone a regular medical education, independently of the great experience they have subsequently acquired."

According to your last answer, regular medical education

and great subsequent experience entitle a party to the suspension of the law in his favour? If that education has been tested by due examination, I certainly do think so. Examination before whom? In the case of the Army and Navy surgeons, not before yourselves. Why then before yourselves, in the case of graduates and licentiates from the universities and colleges of Scotland? From our own experience we may not think, perhaps, that such medical education and examination in Scotland, are so good as may be expected. At any rate, in your previous answer, you have admitted the principle that where the party practising, though contrary to the directions of the Act, has received a competent medical education, then the Society should exercise a discretion, and forbear to prosecute? Certainly, there ought to be, and I believe there generally has been, a discretion of that kind exercised.

It is quite unnecessary to offer any comment on the above evidence, and we hasten to close this section of our examination by presenting our readers with another specimen of inconsistency on the same subject. The witness was Henry Field, Esq., Treasurer of the Society.

"Have the informations upon which the prosecutions of your Society have generally been founded, proceeded in most cases from rival practitioners residing in the same place as the parties informed against? Undoubtedly. Have not the prosecutions instituted upon such informations, sometimes been directed againt persons, who, though not possessing the qualification of apprenticeship required by the Act of 1815, yet were gentlemen who had received a good medical education? I do not think there can have been many of that description; in such cases, why they have not been examined, must have been that they could not prove their apprenticeship. Have there not been many individuals prosecuted, who have gone through all the courses of lectures, and in many cases the hospital practice, required for obtaining degrees or diplomas in the Scotch schools? There may have been a few, but I apprehend, a very few. Is it not unfortunate that the prosecutions directed by the company should have fallen upon

well educated men, rather than upon those who, amongst the whole number of practitioners, were the least qualified from their education to practise? I think that that has been the case. Do you mean to say, that where gentlemen have passed through all the courses of lectures, and the hospital practice required for obtaining degrees or diplomas in the Scotch schools, that these were the individuals who were most ignorant and the least competent to exercise the functions of apothecaries; and, therefore, the most likely to endanger the health and lives of the community? The prosecutions have been principally against the very ignorant, if not entirely. According to your previous statement, it was not the want of education of the party that formed the grounds of prosecution, but the activity displayed by some neighbouring practitioner in discovering that his rival had never served as an apprentice, and in informing against him? I apprehend very rarely indeed; if he was a well educated man he was qualified to be examined. Of what use in court would his good education be, if he had not served an apprenticeship? Of course that made the difficulty. Then, supposing a person to have been well educated, but not to have served the requisite apprenticeship; if such person were informed against and your Society were made cognizant of those facts, have they been wont to forbear instituting a prosecution? I am perfectly sure they would have been unwilling to prosecute. I will not say that they never did, but it must have been a rare occurrence, because they have acted with great lenity, particularly with respect to apprenticeships. Ought they not to select for prosecution the most ignorant? They generally have done so. Might not several instances be produced, where the parties have really received a good medical education? I apprehend very few indeed. * * Has your Society a right to exercise its discretion, whether to prosecute or not, or is it compulsory upon them to do so, whenever they receive information? Not compulsory, absolutely, but they have often been abused in such a manner for not prosecuting, that they could not well avoid it."

The expense of these prosecutions is enormous, and the

amount of penalties recovered exceedingly trifling. The expenses incurred by the Society, in actions and indictments against persons for offences under the act of 1815, to the 17th March 1834, was £6,971 15s. 8d., the penalties recovered £170, and the costs recovered £763 9s., leaving the Society a looser by its prosecutions of the sum of £5,837 16s. 8d.

It is a remarkable fact, that no quacks have been prosecuted, as far as we can ascertain. The witnesses in general assert that it is the most ignorant who are selected for prosecution, but the searching examination of the chairman of the committee, soon brings them to admit, that successful practice is most frequently the test by which they are guided, in visiting offenders with the penalties of the act.

(To be continued.)

MINUTES OF THE COLLEGE OF PHARMACY.

Stated Meeting held March 28, 1837.

The minutes of last stated meeting were read and adopted.

The minutes of the Board of Trustees were read, from which the College is informed that the following gentlemen, having passed an examination before a Committee of the College and the Professors, were duly declared Graduates in the College: viz.

James L. Elliott,	Thesis,	*Magnolia Glauca.*
Gustavus Ober,	"	*Spigelia Marilandica.*
Robert J. Kennedy,	"	*Serpentaria Virginiana.*
Ben. F. Hoeckly,	"	*Iodide of Potassium.*
Wm. Procter, Jr.,	"	*Lobelia Inflata.*
Thos. R. F. Mitchell,	"	*Veratum Viride.*
John Y. Goodyear,	"	*Neutral Mixture.*
Wm. L. Hasbook,	"	*Angustura Bark.*

The following gentlemen were elected Resident Members of the College, viz.:

Edwin A. Hoskins, James Hopkins, John Wetherill, Jr.,

Edward C. Marshall, Jonathan Evans, Jr., George Cuthbert, John C. Lehman, Thomas Cave, William W. Moore, Dr. Wm. Wetherill, Job Jones, and Joseph Hutchison.

The Treasurer's Annual Report of the Finances of the Institution, was laid on the table.

The Annual Report of the Publishing Committee was read.

The Committee on Patent Medicine Directions made a final report, and were discharged.

The College proceeded to the Annual Election, whereupon the following gentlemen were chosen Officers, Trustees, &c., for the ensuing year.

President.

Daniel B. Smith.

1*st. Vice-President*—Henry Troth.

2*d. Vice-President*—Dr. G. B. Wood.

Secretary—Charles Ellis.

Treasurer—Edward B. Garrigues.

Correspondig Secretary—Elias Durand.

Trustees.

Warder Morris,	Edward Roberts,
Richard M. Reeve,	Thos. H. Power,
John C. Allen,	Dillwyn Parrish,
John Bringhurst,	Wm. Biddle.

Publishing Committee.

Daniel B. Smith,	Elias Durand,
Dr. G. B. Wood,	John C. Allen,
Dr. F. Bache,	Charles Ellis,
Dillwyn Parrish,	Dr. Jos. Carson,
Jos. Scattergood,	Wm. Hodgson, Jr.

Extracted from the Minutes.

C. Ellis, *Secretary.*

MISCELLANY.

Adulteration of the Calamine of the shops.—Mr. Robert Brett states, in a letter to the Editor of the British Annals of Medicine, the following facts with regard to this article:—

"Whilst examining some of the powder sold in the shops under the name of *Calamine*, I was surprised to find that any of the mineral acids dissolved but only a very small proportion; this was the case even with nitro-hydrochloric acid, a heavy white powder always remaining after the action of the diluted acid, assisted by heat.

1. Some of the powder in question was boiled for half an hour in hydro-chloric acid diluted with an equal bulk of water, taking care that the acid fluid should be in excess. A white, finely divided and very heavy powder remained unacted upon; the whole was then thrown upon a filter, and the insoluble residue well washed with distilled water, until the wash-fluid ceased to be acid; the powder remaining on the filter was allowed to dry, and then examined; it was not soluble in diluted sulphuric, nitric, or hydrochloric acids.

A. A portion was boiled for some time in a considerable quantity of water, and filtered; the aqueous fluid was divided into two portions; to one a solution of chloride of barium was added without producing any alteration, to the other oxalate of ammonia, also without effect; the powder, therefore, did not contain any sulphate of lime.

B. The powder which had been acted upon by distilled water was then boiled for a considerable time with a strong solution of pure carbonate of soda, the whole was then filtered, the clear fluid which came through was supersaturated with nitric acid considerably diluted; the addition of a solution of chloride of barium to this fluid caused an abundant precipitate.

C. The powder remaining on the filter was boiled with an excess of diluted hydrochloric acid, and filtered; the reacting fluid was abundantly and instantly precipitated by diluted sulphuric acid, and the soluble sulphates. The powder, therefore, was sulphate of barytes, and as it was not altered in the colour by hydro-sulphuret of ammonia, it contained no salt of lead.

D. The acid solution (1) struck a deep blue colour with the ferrocyanide of potassium, and yielded a white but scanty precipitate after some time with a solution of sulphate of magnesia; this precipitate, when collected on a filter and washed, was blackened by hydro-sulphuret of ammonia. Ammonia when added in excess to the acid fluid caused a brown coloured precipitate: this, when washed and digested in a solution of caustic potash, yielded a fluid by filtration, which was not altered by the addition of an excess of muriate of ammonia, although much ammonia was evolved.

E. The ammoniacal fluid, when separated from the brown coloured precipitate, was mixed with hydro-sulphuret of ammonia; a slight opalescence was tardily produced. Another portion of the same ammoniacal fluid was treated with oxalate of ammonia; an abundant precipitate ensued.

From these experiments it would appear that the hydro-chloric acid solution contained iron, as shown by experiment D; the absence of alumina was also shown by the same experiment, and the presence of lead.

The existence of iron, and the probable presence of traces of zinc, were shown by experiment E.

Manganese did not appear to be present; for when a portion of the original powder was subjected to the blow-pipe flame with carbonate of soda, the fused mass did not possess any green tinge, so characteristic of manganese even in the smallest quantity.

The powder when acted upon in the first instance by hydro-chloric acid evolved sulphuretted hydrogen. I next ascertained the quantity of sulphate of barytes in six different specimens in the powder called *calamine* with the following results:—

Specimens.

1.	Sulphate of barytes		83	in 100 parts.
2.	"	"	78	——
3.	"	"	87.5	——
4.	"	"	85	——
5.	"	"	81	——
6.	"	"	85	——

The other ingredients did not appear to differ materially in quantity in the different specimens, as far as could be judged of by a qualitative analysis.

The following may be looked upon as the constituents of the powder of the shops, called *calamine*.

Sulphate of barytes.
Oxide of iron.
Carbonate of lime.
Lead (probably sulphate.)
Zinc? (mere traces.)

Should the above experiments, to which I shall add no remarks at present, appear of sufficient interest, you will, perhaps, oblige by giving them a place in your journal.

Opiate oil.—(Oleum opiatum.)—This preparation is made by digesting at a certain degree of heat, an ounce of crude opium in 16 oz. of oil of henbane, and finally expressing. The difficulty attendant upon mixing the tinctures of opium in use, with fatty substances for external application, has induced M. Neuber to introduce this preparation into practice. It answers well the end for which it is designed, and M. Neuber has already employed it with much success, either alone, or combined with ointments, or with aqua ammoniæ, as volatile liniment.

Pfaff's Mittheilungen, and Jour. de Phar.

Pills and Liniment of Prof. Otto, of Copenhagen, for Ascites.

PILLS :—

℞—Ammoniaci	ʒi.
Ext. taraxaci	
Sapor. venet *aa*	ʒij.
Pulv. Scill.	gr. vi.
Pil. hydragyr.	gr. xi.
ℿ—Ol. juniperi	q.s.

Fiant pilulæ no. xviij.

Dose from 5 to 10 daily.

LINIMENT :—

℞—Tr. sem. colchici.	
digitalis	
scillæ *aa*	ʒss.
ℿ—Lin. volat.	ʒiss.

To be employed as a friction upon the abdomen and œdematous parts.

Casper's Wochenschrift.

Protoxide of Mercury.—Mialhe states that Donovan has inaccurately stated, that the sub-oxide of mercury may be isolated by means of corrosive sublimate, and an excess of a cold solution of caustic potash. By this process, as by others, metallic mercury is procured, and a corresponding quantity of deutoxide, as Guibourt has proved in his inaugural dissertation. *Bull. Gen. de Therapeutique.*

Hydriodic Acid.—Dr. Andrew Buchanan gives the following formula as that according to which the liquid hydriodic acid is prepared in the Glasgow Royal Infirmary: ℞ Iodidi Potassi, grs. 330, Acid Tartarici, grs. 264.

Solvantur seorsim in Aquæ destillatæ, ʒiss. Misceantur solutiones et

quum subsederit Bitartras Potassæ cola. Colato adde aquæ quantum sufficiat ut sint totius liquoris drachmæ quinquaginta, ℥L.=℥vi. ℥ij.

Acidum hoc Hydriodicum liquidum, habet Iodinii, gr. v., in singulis drachmis.

It is a fact well known to physiologists, says Dr. B., that when free iodine is introduced into the stomach, it is speedily converted into hydriodic acid. This conversion is probably effected differently in different cases. If a large quantity of uncombined iodine be swallowed when the stomach is empty, the hydrogen with which it combines may be furnished in part by the gastric juices, but it can scarcely be doubted that it is chiefly supplied from the tissues of the stomach itself, which undergo corrosion. When, however, the iodine is given in combination with starch, it is probable that the starch, while under digestion, furnishes the hydrogen which goes to form the hydriodic acid, and in this way the starch defends the tissues of the stomach from the corrosive action which they would otherwise undergo. It appeared to me, however, that it would be well to save the stomach the labour of preparing the hydriodic acid, by giving, for the purposes of medicine, not free iodine, but the hydriodic acid itself.

I was the more inclined to make this experiment, as it would enable us to determine, from direct evidence, whether the opinion, rendered so probable by general reasoning, be also borne out by experience, that hydriodic acid closely resembles iodine in its effects upon the body, and is in reality the active principle to which the ordinary preparations of iodine owe their medicinal efficacy. The trials made of the hydriodic acid as a medicine fully realized the expectations entertained of it.

The processes recommended in works upon chemistry for forming hydriodic acid are not well adapted for the purposes of medicine, both on account of their complexity, and because they do not yield an acid of which the strength is uniform and easily estimated. The strong mineral acids cannot be employed in decomposing the iodides to form hydriodic acid, as is done in forming muriatic acid from common salt, because those acids react on the hydriodic acid as it is generated. The tartaric acid, however, is not liable to the same objection; and I found on trying the experiment of treating iodide of potassium with tartaric acid, in the proportions necessary to form cream of tartar, that hydriodic acid was readily obtained in a state of sufficient purity for the purposes of medicine, although holding some cream of tartar in solution. To diminish as much as possible the quantity of cream of tartar dissolved, the acids and salts are each dissolved in a very small quantity of water, the rest of the water not being added till the precipitated cream of tartar has been removed by filtering. The liquid acid thus obtained has an agreeable sourness. It is at first limpid, or with only a slight yellow tinge, but as happens to this acid, in whatever way prepared, on being kept it soon assumes first

a wine yellow, and next a beautiful red colour, from a portion of the acid undergoing decomposition, while the iodine disengaged is dissolved in the rest of the acid. It has been ascertained that this process of decomposition may go on till one-half of the acid is decomposed, when the colour of the liquid is a very dark red, approaching to black. The diluted acid, however, prepared as above, may be kept many months without at all approaching this limit.—*London Med. Gaz. and Amer. Jour. of Med. Sci.*

Iodide of Starch.—Dr. Andrew Buchanan, Junior Surgeon to the Glasgow Royal Infirmary, in a communication in the *London Medical Gazette* (July 2, 1836,) extols this preparation of iodine, which he prepares in the following manner:—℞. Iodine gr. xxiv.; Amyli in pulverem tenuissimum triti ℥j. The iodine is first triturated into a little water, and the starch gradually added, the trituration being continued till the compound assumes a uniform blue colour. The iodide is then dried with a heat so gentle as not to drive off the iodine, and it must be afterwards kept in a well stopped bottle. *Ibid.*

Iodine in Minerals and Plants.—Arago stated to the academy that Del Rio had discovered iodine in the horn silver of Albarradon (a district situated in the department Zocateras, Mexico;) that iodine had also been met with in the white lead of the mine of Catorce by M. Bustaments. Lastly, that iodine, which was only supposed to exist in sea plants, has been found in the *sabila* and *romeritos*. The first is a plant of the genus *agava*, which grows in the plains and sides of mountains; the latter a sort of barilla which grows in the floating gardens of the fresh water lakes in the neighbourhood of the town of Mexico. *Journ. de Pharm.*

Crystallized Hydrate of Potash.—The crystallization of hydrate of potash from cold solutions is understood, but the separation of the soft hydrate from caustic potash, melted at a red heat, has been less attended to. Walter digested from 3 to 4 lbs. of melted potash with a little water, allowed the effect of the heat to pass away, added as much water as was sufficient to dissolve the whole, allowed it to stand for 12 hours, and then decanted the solution. The bottom of the vessel was covered with many clear crystals. To preserve these, they must be dropped through a glass funnel into a vessel with a ground stopper, and placed in a cool place. They appear to be acute rhomboids with truncated angles. In vacuo over sulphuric acid they effloresce and become dull. They dissolve in water, producing cold. In the concentrated mineral acid they dissolve with the evolution of heat. In spirit they dissolve without giving out heat. They dissolve in caustic ammonia. By this means bubbles of ammoniacal gas are discharged from the crystals, but which are condensed before they reach the surface of the liquid. The composition was determined by dissolving a portion of the crystals in muriatic acid, evaporating the solu-

tion to dryness, and calculating the composition from the ignited and weighed chloride of potassium. By a mean of two trials, 50.1 per cent. was obtained. Walter considers the formula to be K0+5H0, corresponding with 48.9 per cent. of water. The excess of water he considers to be mechanically mixed with the crystals. The crystals dried in vacuo are sulphuric, and contain 21.4 per cent. of water, corresponding to K0+½H0. Caustic potash melted by a red heat contains 16.05 per cent. of water, and is equivalent to K0+H0. *Central-Blatt, Aug.* 1836.

Essential Oils. All works on pharmacology agree as to the necessity of lowering the boiling temperature of water in the preparation of certain oils. Mailhe states, that there is no use for this proceeding. He placed an ounce of essence of turpentine in eight ounces of distilled water, and submitted the whole to distillation. When half of the essence was distilled, he placed it in a graduated tube, and marked the quantity of essence obtained. He made a second experiment similar to the first, but with water saturated with common salt. He obtained the same quantity of oil as in the first experiment. This experiment appeared remarkable, until the appearance of the fine experiments of Rudberg.

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[The small difference of temperature in these experiments we do not consider sufficient to determine the point. *Ed. British Ann. of Med.*]

Syrups. Some of these are apt to ferment. To prevent it, the boiling syrup should be introduced into hot bottles; the latter then corked, and covered with pitch. When the syrup has cooled, it is to be agitated in order to mix with it the superior portion liquefied by the vapour of the water condensed in the neck of the bottle. It is then to be deposited in a cellar, where it will remain without undergoing any change.

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Calomel obtained by Precipitation.—"Calomel thus obtained is very white, and enjoys much more active properties than what is prepared by sublimation, which it owes to its extreme division."—*Henry* and *Guibourt.*

"When the white precipitate is well washed it has absolutely the same composition as calomel; only it retains almost always a little interposed water; it is very active, because it is much divided."—*Soubeiran.*

"The white precipitate is identical with calomel."—*Soubeiran, Gay, Lussac* and *Thenard.*

"Chloride of mercury thus prepared retains always a little common salt, which cannot be removed by washing. This small quantity is sufficient to give solubility to the chloride, and to communicate to it a very distinct mercurial taste, by changing it partly into mercury and corrosive sublimate; administered internally it excites salivation."—*Dumas.*

"If the liquids are perfectly neutral, at the moment when they are mixed, a subnitrate of mercury is precipitated, which cannot be removed by the most careful washing, and which produces dangerous effects when this preparation is employed internally."—*Berzelius.*

Mialhe has found—

1. That sublimed calomel and white precipitate have no appreciable difference.

2. The solubility of the two chlorides appears the same.

3. The precipitate afforded only traces of chloride of sodium.

4. In two specimens, prepared according to the French *codex*, he detected subnitrate of mercury; but in two other specimens he could find none; of the two latter, one had been prepared by decomposing the nitrate by common salt; and the other, by hydro-chloric acid. In the present case, therefore, a basic nitrate was used. *Journal de Pharmacie.*

On a New Test for Nitric Acid, by J. W. Bailey, Acting Prof. of Chem. &c., U. S. Military Academy. Chemical reagents may be divided into two classes; first, those which produce with the substance they are employed to detect, an action which they will produce with no other known body; an example is starch, as a test for free iodine: secondly, those which cause a certain action with a *small number* of bodies, which they will not exhibit with any others; as, for example, sulphuretted hydrogen, which causes a black precipitate with a *few* metals.

The first class are, of course, the most valuable reagents, as they require no subsequent operation to determine whether certain substances are present or not; while with those of the second class, we only determine that one of a certain number of bodies must be present, but must then resort to other means to ascertain which particular one it may be.

There are many cases, however, when we may know that only one of those bodies which are capable of giving similar results with the reagent added is present, and then if this result *is* produced, the evidence is as satisfactory as can be desired.

The test which I would propose, must be placed among those of the second class, and is therefore inferior in value to morphia as a reagent for nitric acid; but I think it *at least* as valuable as the method by means of gold leaf and hydrochloric acid, or by the bleaching of indigo.

The substance I now suggest, as a new reagent for nitric acid, is the cyano-hydrargyrate of iodide of potassium, discovered by M. Calliot. It is formed by mixing together bicyanuret of mercury and iodide of potassium, (one equivalent of each,) dissolved in small quantities of warm water. It soon crystallizes in a very beautiful manner. This is the same salt which has recently been recommended as a means of detecting the presence of hydrochloric acid in hydrocyanic acid. (See Lond. and Ed. Phil. Mag. Nov. 1835.)

Its use as a test for nitric acid depends upon the fact, that if one of the scale-like crystals be introduced into *most* acids, it immediately becomes

of a beautiful *red*, being changed into the bi-iodide of mercury; while in *concentrated* nitric acid, (spec. grav. 1.4 to 1.5,) the scale instantly becomes almost black, from the liberation of iodine. A scale of the salt introduced into a drop of the acid no larger than a pin's head will show the effect distinctly.

The acids in which I have found the salt to *redden* are, sulphuric, hydrochloric, hydrofluoric, chromic, phosphoric, (if slightly diluted,) and the common vegetable acids, such as oxalic, tartaric, citric and acetic acids.

I have found it to blacken with chlorine gas, solution of chloride, (recently prepared,) bromine, sulphuretted hydrogen, nitrous acid vapours, and *nitric acid.*

It is highly probable, that it would be blackened by bromic acid and chloric acid, and possibly by iodic acid, but I have not at present these acids in a free state to determine their action; the method, however, in which I use the test will prevent any fallacy from the presence of chloric, bromic, iodic or chromic acids, and of sulphuretted hydrogen. It is to evaporate the supposed nitrate to dryness, and introduce into a tube retort a small portion of the salt, on which a few drops of sulphuric acid are to be poured; then on applying moderate heat, by means of a spirit lamp a portion of the volatile products are to be driven over into the receiver, in which a few scales of the salt are previously placed. If these are blackened, the salt is to be considered as a nitrate, provided the presence of those few substances which might cause the same result has been guarded against. Now by the very method proposed, viz., evaporating to dryness and adding sulphuric acid, the presence or absence of chromic, chloric or iodic acid and sulphuretted hydrogen, will be determined; for the colour of a chromate, the evolution of per-oxide of chlorine from a chlorate, the liberation of iodine from an iodate, and the odour from a sulphuret, will at once decide with regard to each. As iodic and bromic acids, even if they are found to blacken the salt, are not sufficiently volatile to be driven over by the heat to be employed, no error could arise from their presence.

I have observed, that if the salt used above, or the bi-iodide of mercury itself, be introduced into a test tube, with strong sulphuric acid, on adding a concentrated solution of any nitrate, (except those of silver and mercury,) the red colour of the scale or bi-iodide will speedily disappear, and will be followed by the dark hue of iodine. Even when the sulphuric acid forms an insoluble precipitate, the action may be seen, by stirring up the precipitate with a glass rod, when the dark spots will be easily observed.

This method of testing may sometimes be used, but is liable to the objection that a chromate, chlorate, and probably some other salts, would give the same result. It is greatly inferior to the method by distillation, as given above. *The American Journal of Science and Arts.*